MESG

MESTRADO EM ENGENHARIA DE SERVIÇOS E GESTÃO

Business Process Re-Engineering using SharePoint in a consulting company

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Master Dissertation

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Dedication…

I dedicate my dissertation to my lovely family and my best friends.

Words cannot describe my feeling of gratitude to my parents Shorhreh and Morteza for their endless love, support and encouragement.

My beloved brothers Armin & Arsalan, who stand with me in sadness and happiness.

My best friends Maryam, Elnaz, Alireza & Hamid; your true friendship makes my life an excellent experience.

Resumo

Este projeto de Reengenharia de Processos de Negócio realizou-se numa empresa de consultoria com o objetivo de melhorar a qualidade do serviço prestado aos seus clientes. Para atingir este objetivo principal definiram-se os seguintes quatro subobjetivos: simplificar a gestão dos serviços; reduzir os erros humanos; aumentar a colaboração; e diminuir os prazos de prestação dos serviços.

A equipa de projeto começou por fazer um planeamento estratégico e selecionar os Processos de Negócio (PNs) a incluir no estudo, sendo depois analisadas as operações com base nos objetivos do projeto e identificados vários problemas.

Com o objetivo de resolver os problemas dos PNs a equipa redesenhou as operações e recorreu às Tecnologias de Informação (TI) para o seu suporte.

Depois da reengenharia dos modelos de PN e da elicitação das especificações de TI, foi selecionado o Microsoft SharePoint 2013 para a implementação do suporte aos novos PNs.

Com o desenvolvimento e parametrização do SharePoint 2013 atingiram-se todos os objetivos propostos.

Este projecto foi uma experiência concreta de melhoria das operações numa pequena empresa, tirando partido das vantagens do recurso às TI. Com base no sucesso deste projecto iniciou-se o planeamento estratégico de operações noutras áreas da empresa.

Abstract

A Business Process Re-engineering (BPR) project had been done in a consulting company. Initial goal was to increase service quality. To reach this super goal four sub goals have been defined; ease service management, reduce human errors, increase collaboration and decrease services lead-times.

Team start project with strategic planning and selecting Business Processes (BPs) for investigation. Then based on project objectives selected operations had been analyzed, therefore several problems identified.

In order to solve the problems in BPs, team decided to re-design the operations and take advantage of Information Technology (IT) capabilities in these operations.

After re-engineering the BPs models and IT specifications elicitation, Microsoft SharePoint 2013 had been selected to be customized in company to support new BPs.

Finally, by implementation of SharePoint 2013, all goals are achieved.

This project was a tangible experience of operations improvement with its advantages by using IT capabilities in a small company. Based on this successful project in company, strategic planning for other operations of company have been started.

Acknowledgement

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1 Introduction

Business Process Re-engineering (BPR) is known as an effective method to improve Business Operations in companies. Increase of fluctuation in macro environment raised the need for BPR projects in order to sustain company's competitive advantages.

BPR projects mainly initiate by a change in macro environment, this change affects business sector of company. Companies react to changes by changing their operations, these new operations will demand new capabilities.

Technology is one of dimensions in macro environment. Technology develops fast, companies to benefit from new technology capabilities should conduct BPR projects.

Among technologies, Information Technology (IT) is developing rapidly. IT still is one of the main tools to increase business productivity, although it passed its golden age in 90s.

IT may seems as a supportive infrastructure in many sectors of business, but its potential contributions to operations makes it 'a must to have' in today business.

In literature, it is mentioned that IT development projects are difficult; because final model may not be well connected to real operation. Bad IT will not only lead to extra works for employees but also will be disable to present high quality information.

In this project a new technology (Microsoft SharePoint 2013) is acquired by company; therefore to benefit from it, a BPR project have been done.

The project aims to execute a BPR project in a consulting company and take advantage of IT in new operations of company.

This Project is different from normal IT development projects. In normal IT projects, teams focus on coupling the operations with IT; however in this project, first problems in operations indicated and eliminated then IT coupled with problem-free operations

Among alternative solutions for IT requirements, SharePoint Microsoft 2013 had been chosen and its applications had been customized to support new BPs.

All goals of project are achieved. Communication of short goals with human side of change helps team to motivate human resource for collaboration in change project.

1.1 Project Overview

Duration of this project was 5 month, it started from February 2015 in Leanked Company.

CEO of HM Consultores (Parent Company) in interview informs author that parent company from October 2014 started to use Microsoft Office 365 as their integrated platform. Office 365 will integrate information system and collaborative network in all child companies, including Leanked Company.

Leanked Company aims to increase its quality of service by taking advantage of their new capabilities provided by Microsoft SharePoint 2013.

Service quality improvement is a super goal depended on different factors. First challenge of project was to break this goal to more tangible sub goals in terms of internal operations.

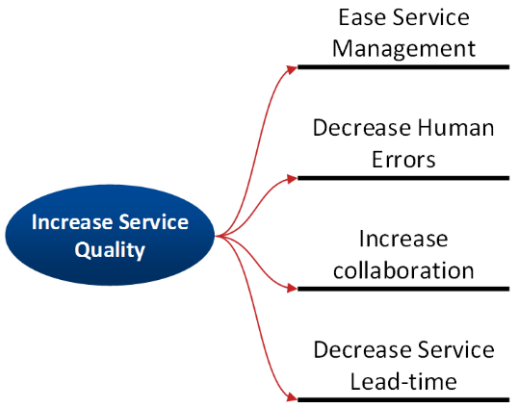

Figure 1- Project Objectives

Figure 1 tries to break this super goal to clear sub goals, these sub goals have direct relation with super goal.

Thesis Methodology

Thesis designed based on qualitative case study with constructive paradigm. Constructivism is based on social creation of reality which increases collaboration between researcher and participants and lets participants to express their point of views and realities for them.

Table 1 represent a brief explanations for different dimensions about this project methodology;

Table 1- Methodology

Dimensions	***This Thesis***
Philosophical Underpinnings	Constructivism
Determining the Case	Selected Business Processes in Leanked Company
Type of Case Study	Exploratory
Single or Multiple Case Study	Single
Case Study Analysis Method	An alternative configuration for an organizational- Level logic model.
Data Sources	Interviews, Observations, Literature Review and Internet

Team benefits from observation and interview methods to gather primary information about user requirements, current business process and objectives. Consequently a list of problems is defined.

In addition to primary information, secondary information gathered from literature review and Internet to design new models and solve existing problems.

Team starts to understand current operations in company and gather user requirements then Based on goals indicate problems.

After understanding the problems, new models have been designed to solve the problems. New models benefit from SharePoint capabilities.

SharePoint had been customized to support designed operations and after usability tests, final version was introduced to company.

Different software had been used during this project;

Bizagi: Business Process Mapping and Simulation.

Nintex workflow for office 365: rapid prototyping and developing of operations workflows in SharePoint 2013.

SharePoint Microsoft Designer: customization of company SharePoint site

Visio Microsoft: designing diagrams.

Visual Paradigm 11.2: this software used for UML diagraming.

Figure 2 represents an overview of project, steps, outcomes of each step and informations sources.

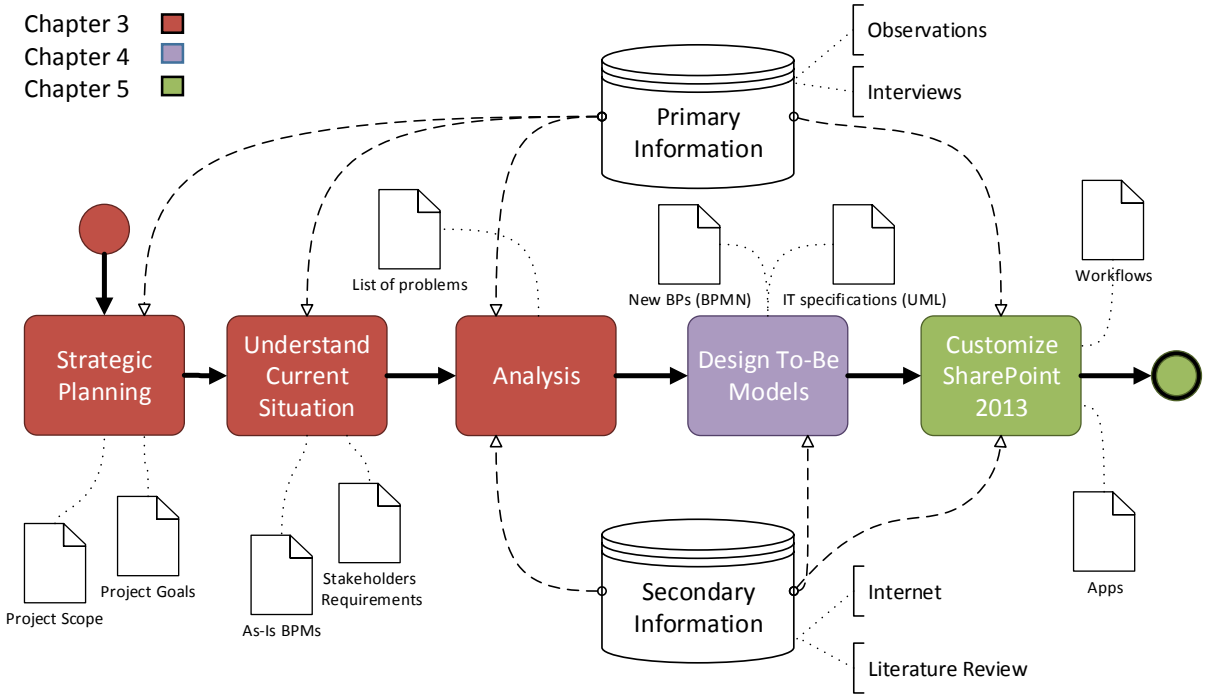

Figure 2- Project Overview

1.2 Company Introduction

HM Consultores Group is a group company with more than 27 years of experience in national and international markets.

Project had been done in Leanked Company which is a child company of HM Consultores Group.

In order to increase specialization and improving the services, considering the growth of HM Consultores Company during previous years. Company decides to diversify its department for Operation Management services to a new company called “Leanked”.

This group company diversify its services in its children;

- HM Consultores; consulting in Business and Management.
- HMBO; consulting in Corporate Finance, Mergers and Acquisitions.
- LEANKED; consulting in Operations Management.

Leanked is a small company focused on Operational consultancy. Consultants are mostly graduated from Industrial Engineering and Management faculties.

Leanked consults clients in main areas of Lean Production, Production Customization and Flexibility, Supply chains, Kaizen and Logistics.

Author believes that young average age of employees and main areas of services reduced resistance against changes in Leanked Company dramatically.

LEANKED HM CONSULTORES HMBO BUSINESS OPPORTUNITIES

1.3 Report Structure

This Project is divided into 6 chapters:

First chapter introduces project, Company and proposed objectives.

Second chapter reviews literature related to issues associated to this project. Relevant concepts are Business Process Modeling, BPR, IT and Microsoft SharePoint 2013.

In third chapter based on observations and interviews in company, project team tried to understand current situation in company. Then models are analyzed and regarding to objectives a list of change candidates are indicated.

In forth chapter, To-Be models (solution) had been developed and discussed.

In fifth chapter, the implementation of solutions and models in SharePoint 2013 is explained.

Sixth chapter is dedicated to conclusions of project and further improvements.

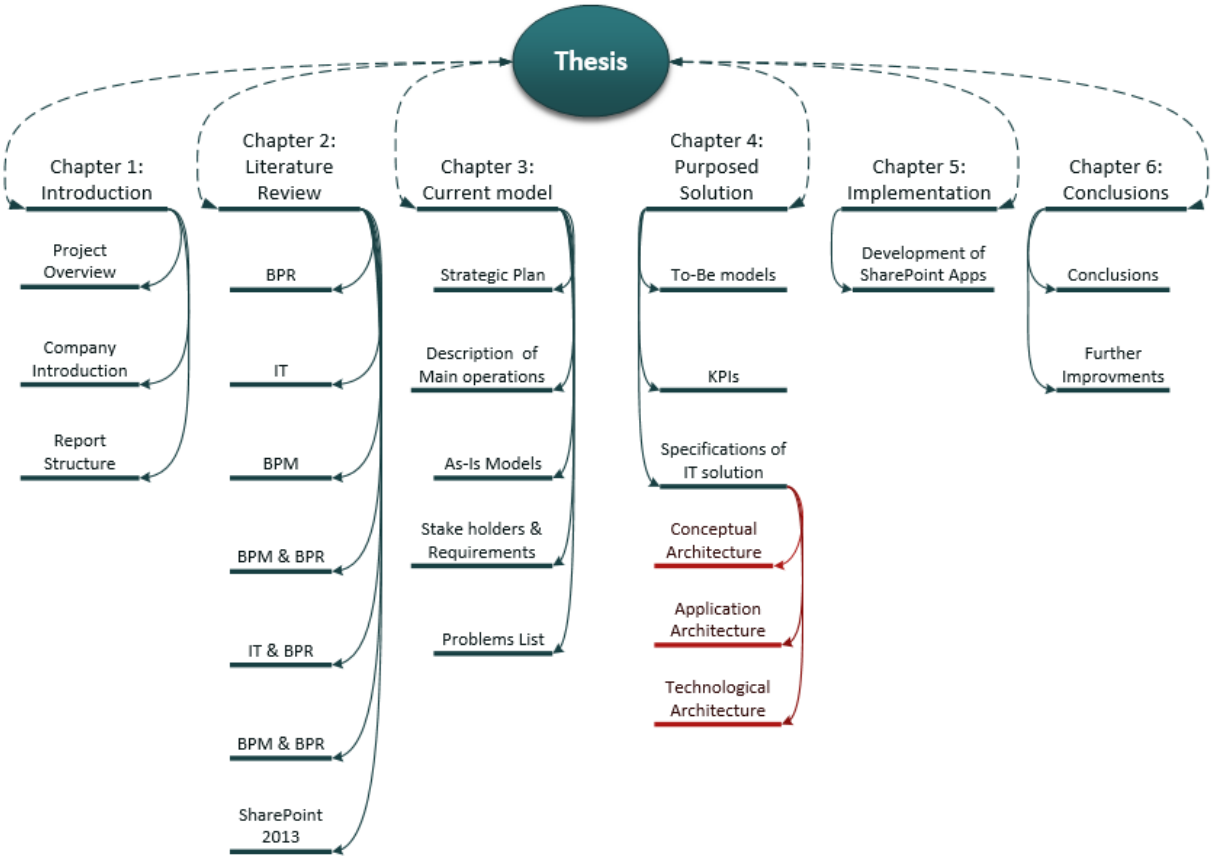

Figure 3- Report Structure

2 State of the art (Literature Review)

Vast area of related literature had been reviewed, during accomplishment of technical project. This chapter aims to summarize most relevant parts of literature review.

Main areas of review include Information Technology (IT), Business Process Modeling (BPM), Business Process Re-engineering (BPR) and their relations. In addition studies on SharePoint Microsoft 2013 (platform as a service) had been done since it is the IT service selected for implementation of solution.

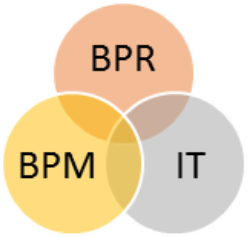

Figure 4- Literature Review topics

2.1 Business Process Modeling (BPM)

What is business Process?

Hammer(Hammer 1990) defined a business process as "a collection of activities that takes one or more kinds of input and creates an output that has value for the customer".

Based on literature, business process consists of five elements:

(1) A Business process has its *customers*;

(2) A Business process is composed of *activities*;

(3) These activities are aimed at *create value* for customers;

(4) Activities are operated by *actors* which may be humans or machines;

(5) A Business process often involves several *organizational units* which are responsible for a whole process.(Davenport and Stoddard 1994)

Companies model their operations to capture meaningful relationships a cross different organizational concepts. BPM represents activities, resources and human or automated actors of these activities.

BPM enables companies to have a better understanding of how the process in company is done. As a matter of fact, human can improves operations which are understandable.

BPMs facilitates the design of communications vertically and horizontally cross organization, it has many advantages such as start to being process oriented instead of department oriented. BPM also provides bases for implementing IT systems and execute BPR projects.

In order to design operation models, a Company can use different standard languages. Two of main languages are Unified Modeling Language (UML) and Business Process Model and Notation (BPMN).

UML is popular in software engineering and BPMN is used commonly in understanding of business operations.

Aguilar did a valuable review on many BPM languages and their differences.(Aguilar-Saven 2004)

In this project, BPMN is used to understand the daily operations and UML used to clarify the desired IT solution. Therefore these languages are reviewed with more details.

Business Process Model and Notation

BPMN was developed during 6 years, the Object Management Group (bpmn.org) published the specification document which splits BPMN components into a core set and an extended specialized set of elements.

These are four basic category of elements in BPMN;

1. Flow Objects such as activities, gateways and events.
2. Connecting Objects, in order to connect Flow Objects by using different arrows.
3. Swim-lanes to categorize activities and functionalities or base on roles in a system.
4. Artefacts, they may add to model to present more related information about model.

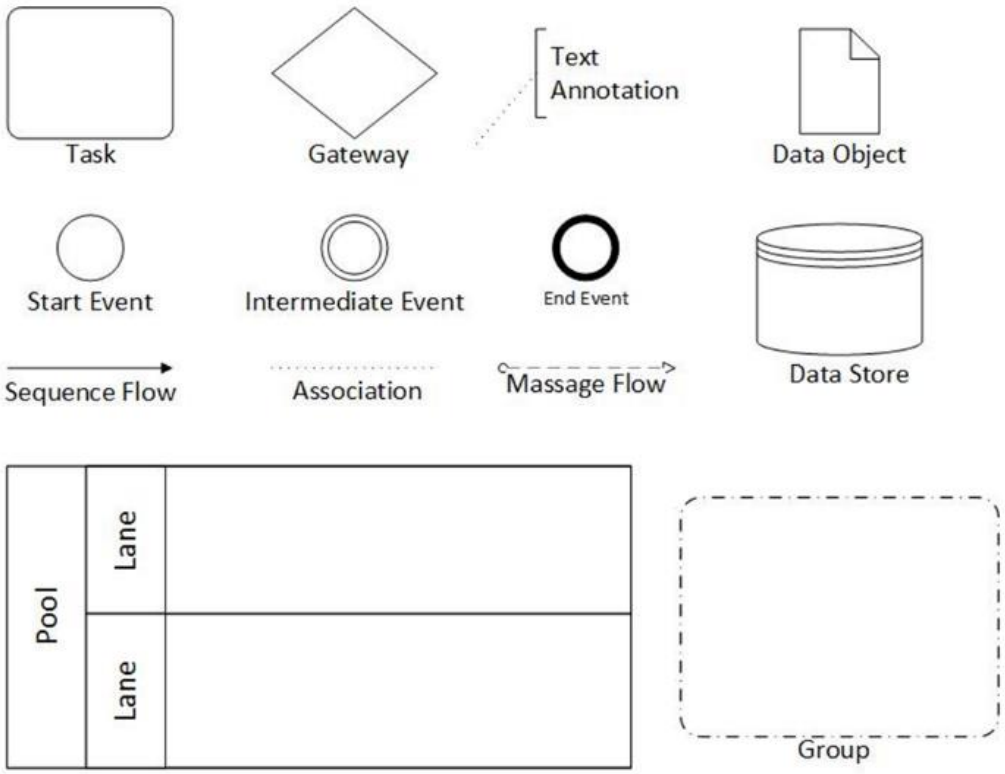

Figure 5- BPMN Basic Elements

Unified Modeling Language (UML)

Base on OMG consortium (omg.org) which is main developer of BPMN and UML, UML is the most used specification introduced by OMG. Engineers use UML in application structure, behavior and architecture; moreover, it is used for modeling the business process.

Generally, UML is capable to model a system to three type of diagrams; Structural, behavioral and interaction diagrams, each one of these groups contains different standard diagrams which are mentioned in table 1.

Table 2- Different UML diagrams

Type	*Diagram Name*	*description*
Structure Diagrams	Class Diagram	Represent business entities in classes and attributes and operations of each class.
	Object Diagram	Similar to class diagram, they use to explain complex relations between objects.
	Component Diagram	Display structural relationship of components
	Composite structure Diagram	They show internal structure of a classifier, classifier interactions through ports or collaboration of roles.
	Package Diagram	Represent system as functional packages.
	Deployment Diagram	Shows the hardware of system and software in those hardware.
Behavior Diagrams	Use case Diagram	Represent graphical overview of involved actors and different functions needed by them.
	Activity Diagram	Represent workflows of any component in system.
	State Machine Diagram	Explain different behavior of objects which act different according different state they are.
Interaction Diagrams	Sequence Diagram	Represent interactions between objects of system and their interaction sequence.
	Communication Diagram	They are similar to Sequence Diagrams but more focused on messages between objects
	Timing Diagram	Presents behavior of objects in a given time frame.
	Interaction Overview Diagram	Presents sequence of Interaction Diagrams

2.2 Business Process Re-engineering (BPR)

BPR comes under focus in 1990s. Companies start to look at BPR as a tool to Increase productivity, reduce resource needs and improve competitiveness.

Hammer and Champy defines it as:

"Fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed''. (Hammer and Champy 1993)

Further on they identify three kinds of companies that undertake reengineering:

1. Companies that find themselves in deep trouble. They have no choice.
2. Companies that are not in trouble but their managers can see trouble coming.
3. Companies that are among leaders in business sector and see an opportunity to be the leader.

Table 2 aims to summarize some definitions of BPR:

Table 3- BPR Definitions

BPR Definitions	Source
"BPR is defined as a radical redesign of processes in order to gain significant improvements in cost, quality, and service''	(Ozcelik 2010)
''methodologies to change their internal business processes in response to environmental change requirements or internal needs''	(Holland, Shaw et al. 2005)
''an approach used to create a computer-based system for the management of the supply chain traceability information flows''	(Bevilacqua, Ciarapica et al. 2009)

Although older definitions of BPR define it, as radical improvements. but many authors claim that it is not possible for many companies and organizations to change radically such as Public sector.(Stoddard and Jarvenpaa 1995)

Generally, the topic of BPR involves discovering how BPs currently operate, then redesign these BPs to improve their performances and to implement the process changes in order to gain competitiveness.

Many BPR methodologies are defined in the literature, they share one common task; modelling existing and new company's business processes.

Plenty of time in a BPR life cycle is spent on the analysis of existing BPs to identify operations with worst performance, most critical and high probability of successful reengineering.(Muthu, Whitman et al. 2006)

What is the goal of BPR?

The goal is to achieve dramatic improvements in business measures of performance by radically changing the process design.(Aldowaisan and Gaafar 1999)

How to execute BPR project?

Different ways in literature are mentioned, one of them purposed by Zhou and Chen, they divide the BPR project into 3 phase;

1. Rethinking phase, to find problems out in existing business processes.
2. Redesigning phase, to devise countermeasures to solve those problems.
3. Reconstructing phase is to implement reengineering plans.(Zhou and Chen 2010)

figure 5 represents another BPR plan with more steps, it is not in conflict with previous phases;

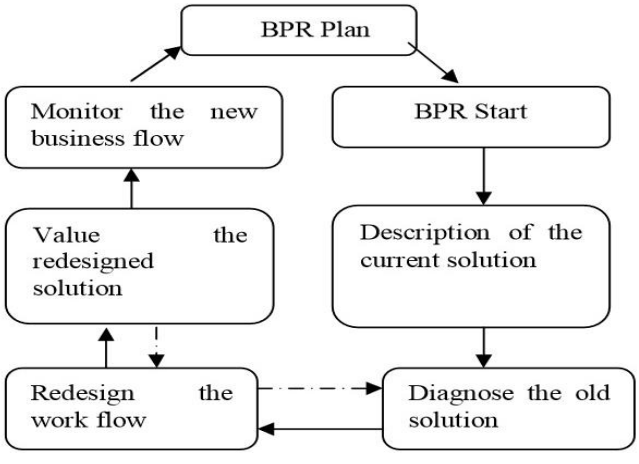

Figure 6- BPR Project implementation steps (Kettinger, Teng et al. 1997)

How is it possible to categorize BPR best practices?

Different types of BPR practices is presented by Davenport, these types are reviewed in following Table. (Davenport 2013)

Table 4- categorization of BPR best practices

	Category	*Answering this question*
1	Customers	How can improve quality of contacts with customers?
2	Business process operation	How do efficiently implement a workf1ow?
3	Business process behavior	When is the best time for workf1ow execution?
4	Organization	Are both structure of the organization (mostly the allocation of resources) and the resources involved (types and number) well managed?
5	Information	Which is information that business process uses, creates, may use or may create?
6	Technology	Which technological capabilities the business process uses or may use?
7	External environment	How can improve upon the collaboration and communication with the third parties?

How a BPR project fails?

There are many reasons presented in literature about BPR project failure, some of them are in common with IT projects.(Bashein, Markus et al. 1994; Kliem 2000; Davenport 2013)

1. An unclear definition of BPR project in terms of strategic point of view;
2. Unrealistic scope & expectations;
3. Inadequate resources;
4. Taking too long to produce outputs. (BPR should produce tangible results within realistic timeframes);
5. Lack of sponsorship by stake holders;
6. Wrong scope (either too narrow or too wide);
7. Too great (or to little) reliance on new information technology;
8. Lack of an effective methodology and system.

2.3 BPM & BPR relationship

To support BPR project in the company, several methodologies are emerging. Each focused on the analysis of the company's Business Processes. These BPR methodologies share one common task: modelling current situation and new company's business processes. Business process modeling techniques are used to fulfill this task, In other words; Business processes modeling (BPM) is essential within a BPR life cycle.(Menzli, Ghannouchi et al. 2007)

Business process modeling is one of the most significant activities in a BPR project. All BPR methodologies in the literature share two main activities: the diagnostic step and the redesign step.(Bosilj-Vuksic, Giaglis et al. 2001)

In both steps, there is a clear need to a tool to provide language for modeling (As-Is) and (To-be) stages of organization, here is the relation of BPM and BPR.

In addition, BPM method can possess the analysis capability in facilitating process evaluation and alternative selection. To serve these purposes, computer simulation is applicable due to the progress of information technology.(Lin, Yang et al. 2002)

2.4 Information Technology (IT)

"IT contribution remains substantial, accounting for more than a third of labor productivity growth since 2004".(Byrne, Oliner et al. 2013)

IT saves company's resources, it reduces errors, tasks lead-times and automate activities.(Gunasekaran and Nath 1997)

What is IT?

Laudon defines IT as a set of hardware and software that allows organizations to perform tasks such as acquisition, transmission, storage, retrieval and display of data.(Laudon and Laudon 2004)

What are IT benefits?

It is clear that IT is an 'enabler' and a 'creator of opportunities' in business. During last two decades there was huge improvements in different sectors; such as E-commerce, E-Government, Collaborative networking, enterprise systems including: Enterprise Resource Planning, Customer Relationship Management; all of these lets companies to produce more with less Resources. (Groznik, Kovačič et al. 2008)

IT improvements differ for each sector and they are countless. Table 4 summarizes three of most important of IT benefits related to this project;

Table 5- IT benefits related to project

Benefits	*How*	*Reference*
IT promotes Innovation	IT provides a bigger pool of knowledge by connecting different actors especially in collaborative networks and knowledge learning organizations. Thus, it is arguable that IT provide means for organizations to be more innovative.	(Dewett and Jones 2001)
IT Promote Efficiency	Transferring high volume of information between departments not only save time also decentralize decision making in company by providing valuable information cross the organizations, in some companies which are following kaizen culture giving authority cross organization is vital.	(Modarress, Ansari* et al. 2005)
IT Promote fast reaction to environment	IT helps companies to tackle issues pro-actively rather than report on it after the fact.	(Kumar and Bhatia 2011)

Although IT could bring many benefits for organizations. There is a high risk for its failure in implementation inside the organizations.

2.5 IT contributions in Business Process Re-engineering

''Information system development can often be addressed as a BPR practice, either because it automates some human-based processes or because it replaces an existing legacy system''-
(Grau, Franch et al. 2008)

In order to mention IT contributions in a BPR Project, it is important to first define general steps of a BPR projects. Then discus how IT contributes to those activities in a project. A literature review had been done to shortly summarize IT contributions in each defined step.

Discussion

Many frameworks for a BPR project have been purposed; however, it is arguable that most of them contain these overall steps: 1. model the current situation (As-Is), 2. Analysis of current model, 3. Design new model (To-be), 4. Implementing new model.(Serrano and Den Hengst 2005)

Modelling current Business Model (As-Is)

Modeling the current situation helps company to identify business processes for further analysis and improvements. This step contains sub steps such as: identifying stakeholders, Defining objectives, actors and Business Process Modelling. Most of these activities involve different department's teamwork, interviews and top-down strategic approaches.

If company use an appropriate IT system, designers are able to draw a simple model of BP base on existing IT system documentation which eliminate hours of interviews. If existing IT system is capable to perform Business Process Mining, design team is able to construct BPMs base on event logs in IT system. (Yi-wu, Xiao-wan et al. 2007) (Ingvaldsen and Gulla 2006)

Moreover, IT eases communication of stakeholders in company considering various involved departments.

Analysis of current business model

BP and IT modelers will measure performance of As-Is model in both qualitative and quantitative terms that will reveal problems considering process and organization objectives. Well-designed IT systems will able designers to perform Business Process Mining and if-scenarios simulations. The process to discover system defects in this case will be quite faster and more precise. (Hicks 2007)

Design new business model

In service design, stakeholder's requirements play a significant role. IT as a communication channel will increase stakeholders involvement and makes a pool of ideas and requirements, which leads to innovation and better requirements satisfaction in company.(Wu, Li et al. 2012)

In addition, designers are able to take advantage of new IT capabilities introduced in environment which could increase performance of suggested design. IT could also be able to simulate the new suggested processes to test them before implementation.

Implementing new model

Many authors claim that active involvement of stakeholders and user training are critical in success of a BPR project, IT is a key enabler in both of these areas.

IT helps more involvement of stakeholders, therefore increase feeling of ownership of change. In addition, IT is a powerful tool for employees training.(Lapointe and Rivard 2005)

IT also can overcome difficulties in change management along different departments.

Conclusions

Companies are forced to conduct BPR projects to sustain their competitive advantages, these changes will damage company if needed capabilities are not provided. As discussed in the previous parts, IT plays a significant role to provide these capabilities for BPR projects, Table 1 shortly review them.

Managers should consider that constraining IT capabilities to just support initial business process although it will perform its duties in suggested BP model but will limit company

opportunity in further organizational improvements; either to support new BPs or to analysis the current model weaknesses and makes further changes more costly that could damage company in terms of flexible reactions to dynamic market.

Table 6- Contribution of IT in Business Process Re-engineering

Overall BPR steps	IT contributions in each step
1.Model current Business Processes	Exciting IT documents, Provide a general model & ease access to operators.
2.Analysis of current model (As-Is)	Statistical analysis base on KPIs, Business process mining, Representing lead times and bottlenecks.
3.Design new model (To-Be)	Ease communication between stakeholders, Enable human centric design, New technological capabilities to improve the exciting process, Increase innovation, Ease requirements gathering, Rapid prototyping, Ability of simulation and test.
4.New model Implementation	End user training, decrease human resource resistance against change.

2.6 BPM and IT relationship

Business process modeling is arguably one of the important domains of interest in information systems research over the past three decades. From an Enterprise Modeling perspective, business process modeling is valued as a complement to domain modeling.

BPM allows to capture the organizational dimensions in terms of actors, activities, and workflows. Business process models are required as a basis for knowledge transfer, quality purposes, regulations, communication between internal and external collaborative partners, and documentation in general.

One of the first steps in implementation of IT is designing BPM, without a good BPM any organization is not able to implement an IT system. (Zachman 1987).

2.7 Microsoft SharePoint 2013

Articles in literature about SharePoint 2013 are not very strong, therefore author used a book written by Tony Smith titled ‘Introduction to SharePoint Technologies’ as a reference. (Smith 2013)

SharePoint 2013 is a Microsoft’s business collaboration platform. It is a web based platform that facilitates employees to effectively manage, share information, automate business processes and interact with others. Its connection to Microsoft office enables staff to organize content, share work, and promote agile working.

Main SharePoint goals briefly are:

1. Facilitate information system integration for project teams; therefore, actionable information will be accessible for correct person to respond to business needs.
2. Facilitates collaboration in company to increase staff productivity.
3. Reduction of costs by providing enterprise-wide business solutions by its application services which work together to satisfy user needs.

Capabilities of SharePoint 2013 is divided by Microsoft into these categories:

- *Share*:
  Collaboration and social capabilities to support teamwork and knowledge sharing.
- *Organize*:
  In a project there are different materials which should be managed, SharePoint enables team to manage documents, tasks, team communications and project status.
- *Discover*:
  Search for information is time consuming activity for staff, a good search ability helps employees to save their time. In addition SharePoint allows employees to locate people base on their interests and backgrounds.
- *Build*:
  Developers and web designers can create new experiences on SharePoint using familiar tools and internet standards
- *Manage*:
  SharePoint provides comprehensive tools that allow delegation of management responsibilities to the owners of the processes and related informations. It provides tools to automate the management and governance of processes and information.

Since it is not possible to discuss topics deeply considering literature review objectives, in this section just an overview on lists and workflows in SharePoint is presented.

Lists & workflows

Structured information is stored in lists. There are different kind of lists in SharePoint which are reachable as templates in applications (Apps). End user can customize columns in templates to develop desired list. Table 6 presents some of List App templates.

Table 7- Some of list Apps Templates

Name	***Description***
Contacts	To store and maintain details about people.
Calendar	To store and maintain Event details.
Issue Tracking	To help employees to store and manage issues occurred.
Survey	To store and maintain people opinions concerning a survey.
Announcement	To store and share messages.

In SharePoint each list could be associated with several supportive capabilities, including workflows.

Workflow is one of the most important capabilities of SharePoint, its power to automate business process leads to significant advantages:

1. Lead-time reduction, increase productivity in associated business processes.
2. Ensure consistency and standardization.
3. Better control and monitor of processes by extracting logs from workflows to feed predefined Key Process Indicators (KPIs).
4. Reduction of human errors.

In SharePoint, Workflow Manager support Workflows. Each single execution of a created workflow called workflow instance. Information needed for workflows stores in the site, that workflow is created in, there are two main type of lists store a workflow instance informations.

First list supporting a workflow is 'Task list'. This list stores and maintains all information regarding created and assigned tasks through workflow instances, which is accessible easily.

Second lists are 'Workflow History'; this list is not easily accessible and stores information about all actions accrued in Workflow instances.

To create a workflow, there are different approaches that provide different level of capabilities for workflow. These approaches are:

- *Out of the box:*

  Available in SharePoint site to create basic workflows.

- *SharePoint Designer:*

  This free downloadable software allows users to create workflows by combination of series of events, conditions, and steps.

- *Visual Studio:*

  To create '.NET' workflows which require higher technical knowledge and usually is done by a SharePoint developer. These workflows must be deployed by technical administrator.

- *Third Party Solutions:*

  It is possible to use middleware applications developed by third-party companies to empower end user to enjoy a more user friendly way of workflow creation; they usually aid user by a visual workflow design interface and provide different variety of integration.

  One of well-known applications in this area is 'Nintex workflow for office 365' which in this project had been used to create workflows to support solution implementation in chapter5.

3 Current situation

Scientifically power of analysis depends on knowledge about subject, any improvement starts by understanding current situation. First step of a BPR project can be divided into five main parts:

1. Strategic planning of BPR project.
2. Identification of main operations.
3. Stakeholders and their requirements identification.
4. Business Process Modeling of As-Is models.
5. Problems and change candidates identification.

3.1 Strategic Planning of BPR project

All companies in their corporative strategy choose their business sectors and target markets. Inside each business sector, they define their operational strategy and define business operations which lead to different products and services.

All companies for their products and services define a list of order winners and order qualifiers to clarify their competitive position in industrial sector. This strategic view to company helps BPR project team to scope better the project.

In case of Leanked Company, project team according to meetings and company sector indicates some of order winners and qualifiers in Table 7:

Table 8- Examples of Order winners and order qualifiers in consulting sector.

	Order qualifier	*Order winner*
1	Physical Evidence	Experienced Consulters
2	Educated Consulters	Service Lead time
3	Well organized system	Service Cost

Companies are different because their competences are different, each company follows different operations to deliver its services and products,

Quality of products and services depends on their creator operations. Business operations improvement methods including BPR are popular, since they increase company's competences.

What is project goal?

Improving service quality is the main goal of project since it is a broad goal, project team divides it into more tangible sub goals;

1. Increase collaboration of employees and departments;
   Collaboration lets consulters to be more innovative and let company to take advantage of its experienced consulters. In addition collaboration increases productivity.
2. Decrease human errors;
   A high quality service is a problem-free service; reduction of human errors plays a significant role in this context.
3. Ease service management;
   By monitoring services and projects, company can prevent problems and response to them quickly.

4. Decrease service lead-time.
   Client consider time as a valuable resource. Being fast in service delivery most of a time appreciate by client.

Which operations?

Project team chose ‘Operational Planning Leanked (POL)’ and ‘Operational Improvement Project Leanked (PMOL)’ as main operations to be investigated.

POL and PMOL are the longest operations. All services are produced by them.

In addition to these main operations, project team decides to improve some of other operations in company. These operations are internally and serve employees.

3.2 Identification of main operations

Leanked is a company in Industrial Consulting sector, it approaches client’s companies to serve them by its services. Company follows a predefined BP regarding its new clients. This BP consist of two main parts; a short term (POL) and long term (PMOL). First clients sign contract for short one then if there is an agreement for long term corporation, client will enter to long term process.

POL BP (Short term)

‘Operational Planning Leanked (POL)’ operation provides basis for the long term process (PMOL), during POL BP companies define a project to investigate the potential improvements in client’s facility.

In a POL project, manager selects a project team, team contacts client and do regular observations and interviews in client’s facility (mostly a factory). Then project team prepares a final report about project outcomes and analysis of possible improvements.

Main document is created whiten this BP is final report that deliver to client as a part of proposal for PMOL project. Although there are other documents such as daily reports during POL observations and internal presentation before final presentation. These documents are not shared with management team which cause problems concerning flow of information, collaboration and use of senior consulter’s experience.

Lead-time of project is important since it is first contact with client the service quality has a great impact on further decision of client to continue to next contract. Therefore an objective in this process is to minimize the lead-time.

Quality of service depends directly to innovative suggestions by consulters. In order to increase productivity and quality of service, consulters’ access to information is important.

Managers cannot comment effectively on team’s proposal in internal meeting, because management team do not participate in observations, also they do not receive any detailed report about the observation. Therefore client loses its chance to benefit from senior consulter’s experience.

During interview, manager points out that long interruptions in projects are caused by lack of standard support process for projects faced problem.

Since operation is not transparent, it is hard to track the root of a problem and even some problems are not reported to management team.

Finally, lack of established operation between project team and financial department leads to miss organized reaction to client's payments.

PMOL BP (Long term)

'Operational Improvement Project Leanked (PMOL)' aims to achieve improvements suggested in final report of POL project.

This project accomplishment takes from three to eighteen months, this is quite longer than a POL project which would last for maximum two month.

Usually project teams are different in POL and PMOL, based on capabilities needed and objectives of these operations.

Always, the new project team (PMOL Team) needs the information about previous phase of project with client (POL). This information could be technical information such as proposed improvements or non-technical information such as organizational culture in client facility. These informations should be transferred from team to team which currently does not follow a standard process and it decreases service quality especially at beginning of PMOL.

POL and PMOL differences

These sequential processes have significant differences:

1. Client starts with a POL project, however PMOL is optional to be continued.
2. In PMOL projects, some tasks are repetitive such as 'approve financial status' or 'prepare monthly report'.
3. Technically, POL projects requires criticize thinking and knowledge about different concepts; however in PMOL deep knowledge in specific area is useful with less innovation involved.

   In PMOL, project execution path is clearer than POL, POL suggestions leads manager to choose different project teams.
4. Bing first touch point, increases effect of POL on client's mind, therefore tasks are more sensitive to be done perfect. For instance lead-time of POL project may have significant effects on client decision.

Other operations

In terms of management practices company is new and small, many of operations do not follow an established standard procedure yet.

Lack of standardization and definition of steps leads to different problems; such as difficulties for reporting, management of these processes and reduction of employee's productivity.

In next chapter, some of those processes will be designed to increase standardization and solve problems caused by these unclear operations in company.

Project team decides to consider these BPs for re-engineering because of requests from management team. These operations improve employee's productivity and resource efficiency of company.

Leave Request:

This operation aims to manage and store data about employee's leaves. Also automates the process of requesting. Currently employees contact manager directly in different ways that increase human errors, decrease manager productivity and operation management is difficult.

Task Assignment:

There are some tasks which are not predefined in company, the assignment of these tasks is informal (oral or by emails), these informal assignments may face human errors and their data is not stored to be manageable. Since manager cannot track and compares employee's productivity, motivational plans could not be successful.

Resource Reservation:

An integrated calendar in SharePoint of company enables employees to make an event about a resource; however this operation could cause very important problems such as, possibility to reserve a resource by two different employee in same time.

Also current process does not support resource optimization and resources are not defined in system to be selected.

Management team cannot take advantage from data created in process for long term decisions about resource strategy of company. For instance if management team know most needed resource (bottleneck), company can increase its capacity according to that resource.

3.3 Stakeholders and their requirements identification

There are four groups of stakeholders, although there are clients out of company which are stakeholders for POL and PMOL BPs. Project team does not consider clients as stakeholders because of time limitation and very difficult access to clients in this project.

In this project stakeholders are:

1. Management Team (CEOs)
2. Consulters (Project Team)
3. Financial Team (CFO)

During interviews, it reveals that these stakeholders have different requirements based on their roles. Table 8 shows most important requirements by each group.

Table 9- Stakeholders and their requirements

Stakeholder	*Number*	*Requirements*
Management Team	1	Transparency of operations and projects.
	2	Definition of KPIs and store of KPIs data.
	3	Less need for physical presence.
	4	Better coordination with employees.
Consulters	5	Standardization in operations.
	6	Access to templates for reports.
	7	Integrated information system.
	8	Automation in simple tasks.
	9	Clear definition of roles.
Financial Team	10	Better connection with Team Leaders regarding financial status of projects.
	11	Clear process to follow.

3.4 Business process modeling of current situation (As-Is model)

There are different approaches to represent information in any subject. For information about business processes one of the ways is business process modeling.

In this section, BPMN language is used to represent As-Is models of selected operations.

As it is discussed in previous section, only POL and PMOL operations follow a standardized patterns, their BPMs are presented in next page.

More details on each activity mentioned in these models are presented by tables 14 and 15 in appendix A.

‘What if an activity face a problem?’

This question could be raised about these models. There are not any standard process to be followed in case of problems in activities.

Project team innovates operation ‘Problem facing’ for To-Be models that will be discussed in next chapter with new operations models.

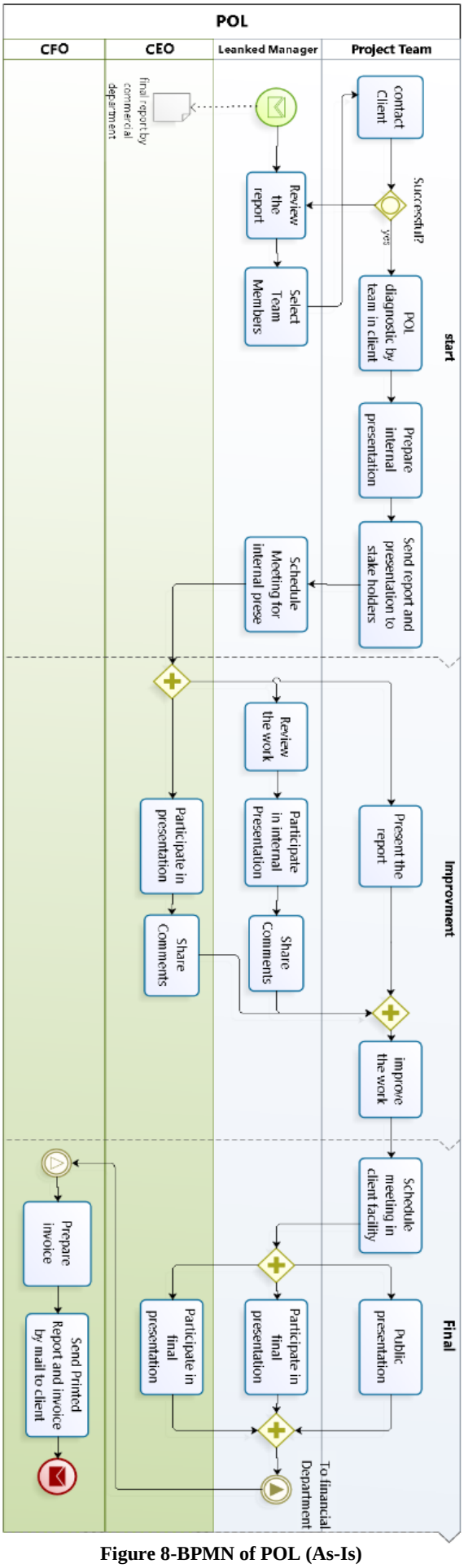

Figure 8-BPMN of POL (As-Is)

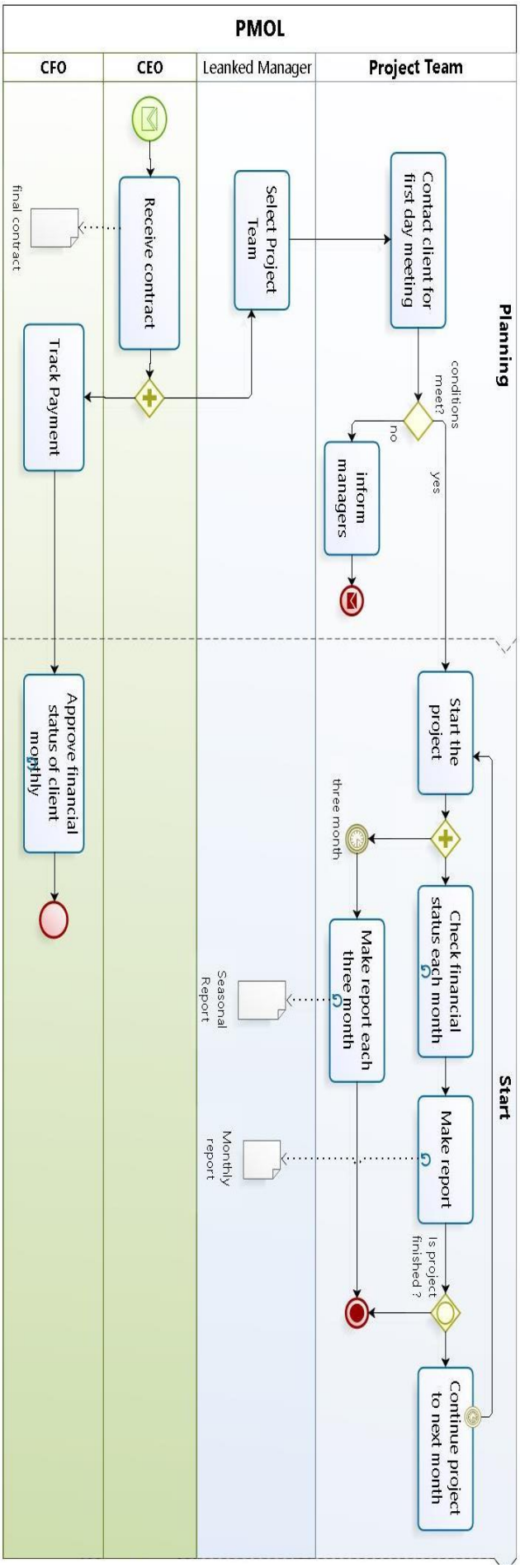

Figure 7- BPMN of PMOL (As-Is)

3.5 Problems and change candidates Identification

In order to design a new solution, particularly better business operations in next chapter. For project team, it was vital to finish this step with a list of problems or difficulties that To-Be models should aim to solve.

Project team consider three dimensions to identify problems and change candidates, then investigates relations between them.

1. Project objectives; Operations should be criticized base on overall project objectives.
2. New capabilities; Project team should consider possibilities in operations to benefit from new technology capabilities.
3. User requirements, they are important for project to design To-Be models with user centric design. This kind of design eases change in organization since stakeholders feel ownership of change.

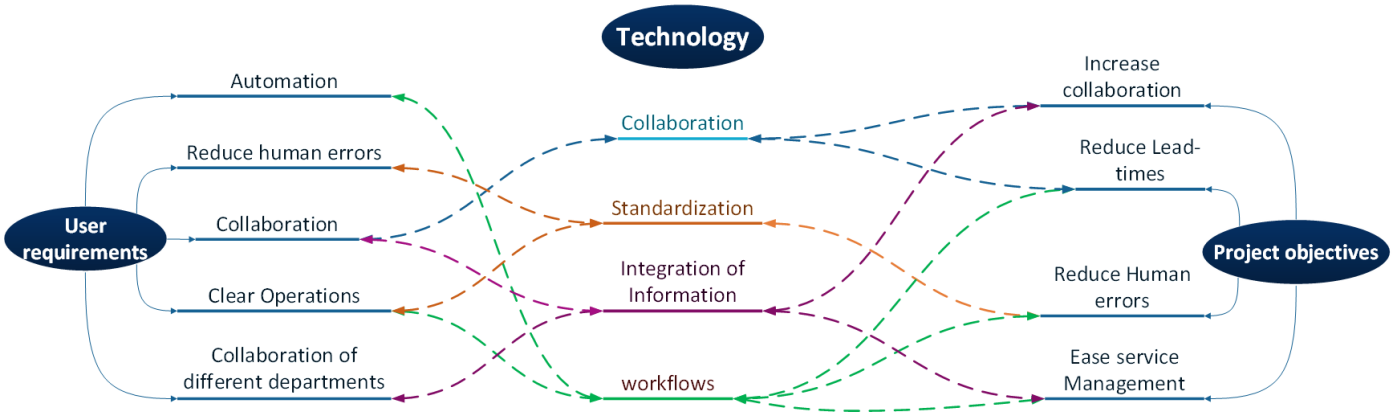

Figure 9- List of problems

Team developed figure 8, although diagram does not represents all relations in project but it is a try to better understand the change candidates and problems.

To explain figure 8, it should consider that relations are designed in this format;

[User requirement] is possible due to [Technology] capability that satisfies goal(s) to [Project objectives] of project.

For instance; [Automation] is possible due to [workflows] capability that satisfies goals to [reduce lead times], [human errors] and [ease management].

As a conclusion of this chapter, Project team indicates eight problem in current situation. Table 9 represents these problems.

Table 10- List of problems

Number	*Problem, Improvement Candidate*	*Based on*
1	Lack of tasks automation.	Req.8
2	Lack of integrated Information System	Req.7,10,4
3	Lack of processes transparency	Req.1,3
4	Lack of KPIs	Req.2,3
5	Lack of standardization in operations	Req.5,3,10
6	Lack of formalized connection between departments	Req. 10
7	Lack of well definition of roles in operations	Req.9,11
8	Process Innovation for other operations	Req.11,5,4

4 Purposed solutions

In this chapter, project team to solve the problems categorized them in two group.

First group belongs to problems caused by wrong structure of business models such as problem 5 and 8 in Table 10. Author believes these problems does not need new capabilities and activities flow leads projects to these problems.

Second group is problems demanding for new technology capabilities. Therefore to solve all problems, project team proposed redesign of models and developing IT in company.

Suitable IT solution will feed needed KPIs, defines roles precisely, increases transparency of processes, increases standardization in processes, connects different departments, integrates the Information system and automates BPs partly in company.

Table 10 shows how IT solution can solve indicated problems and improve change candidates.

Regarding problems number 5 and 8, developing BPMs will improve both standardization and provide defined process for BPs that do not follow a standard process.

Table 11- IT contributions to solve the problems.

	Problem & Improvement Candidates	***How IT Helps…***
1	Lack of tasks automation.	Capability to automate predefined operations, still BPMs are needed.
2	Lack of integrated Information System	Employees can use defined IT solution to store information and access them.
3	Lack of processes transparency	In a defined operation, IT is able to track the operation by storing data about BP.
4	Lack of KPIs	IT is capable to feed defined KPIs automatically.
6	Lack of formalized connection between departments	Ease interdepartmental transfer of information.
7	Lack of well definition of roles in operations	Assign tasks manually or by automation to different stakeholders in a workflow.

4.1 To-Be Models

In this section BPMs are redesigned and introduced as TO-Be models. Based on these problem-free operations, IT development will start in next sections.

Five operations are redesigned; PMOL, POL, Problem facing, Leave request and Resource emergency. Their new BPMN models are presented in Figure 10, Figure 11, Figure 12, Figure 13, Figure 14, respectively.

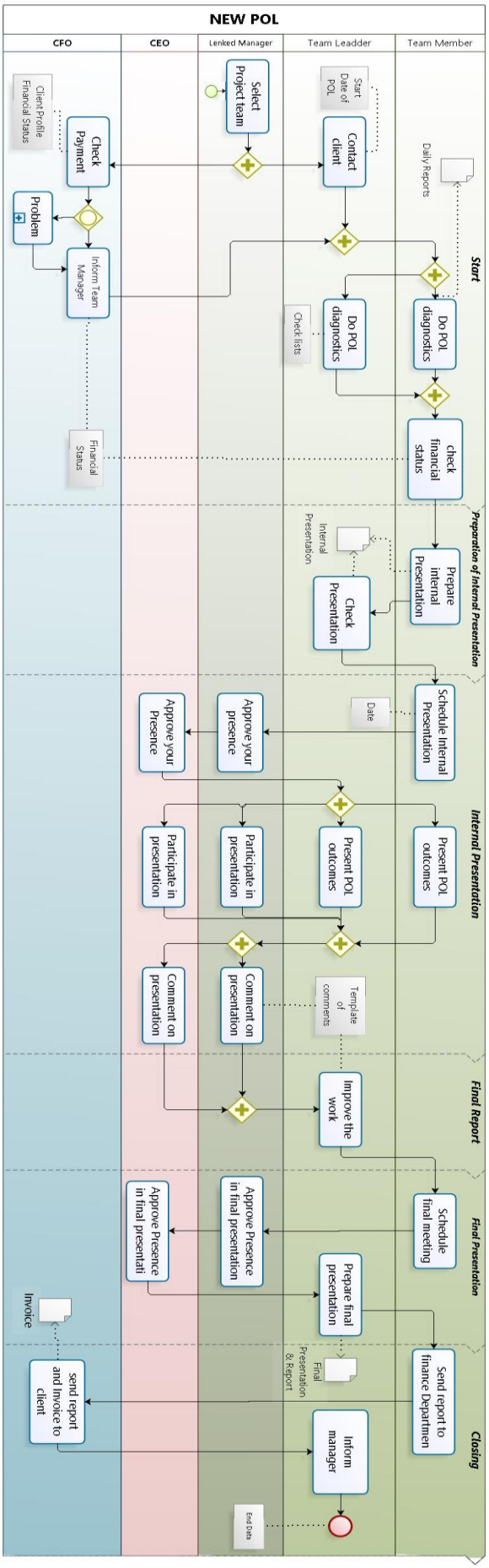

Figure 11- BPMN of POL (To-Be model)

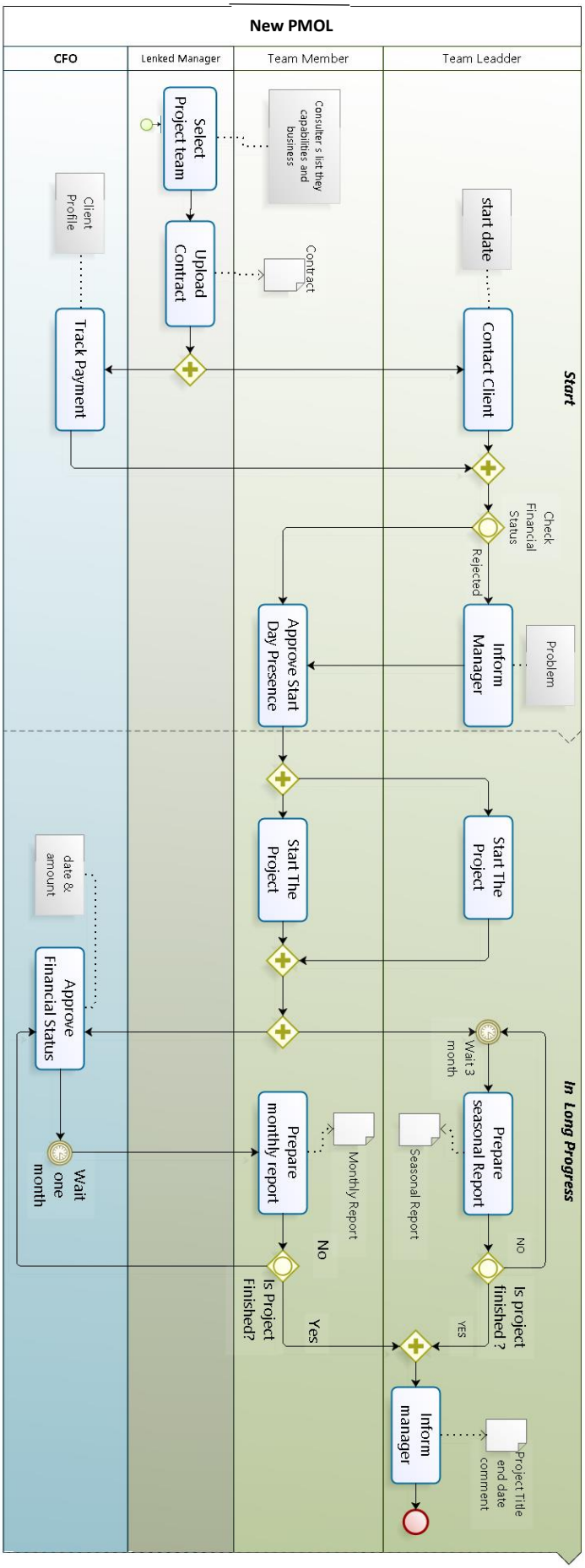

Figure 10- BPMN of PMOL (To-Be model)

Main changes in diagrams

Firstly, Team Project is divided into its members, 'Team Leader' and 'Team Member'. Therefore roles are clear in new BP, there were an analysis about these assignments of tasks. For instance, first contacts with client is made by 'Team Leader' who is more experienced or 'Team member' should prepare reports and a final review is assigned to 'Team leader' to save his/her time. (Problem 7, Table 10)

Secondly, better view on documents and information created in processes are presented. It will help company to increase standardization (problem 5, Table 10), also this will help IT team to have better understanding of associated information in these operations (problem 2, Table 10).

There are three more BPMN models designed to increase employee productivity and standardization; 'Resource Emergency', Leave Request' and 'Problem facing'.

Problem facing

During POL and PMOL projects, sometimes a consulter in-counters a problem but unable to solve, this cause interruptions in projects.

In current situation there is not a standard process for employees to handle these problems. In To-Be models if they cannot solve a problem, they should follow 'Problem facing' process.

This process not only clarify and standardize the process; but also, store information about problems happened in projects.

Data created by process could feed requested KPIs of company (see Table 12) and also these data indicate potential candidates for change in future, therefore these data extracted from operations have strategic value for company.

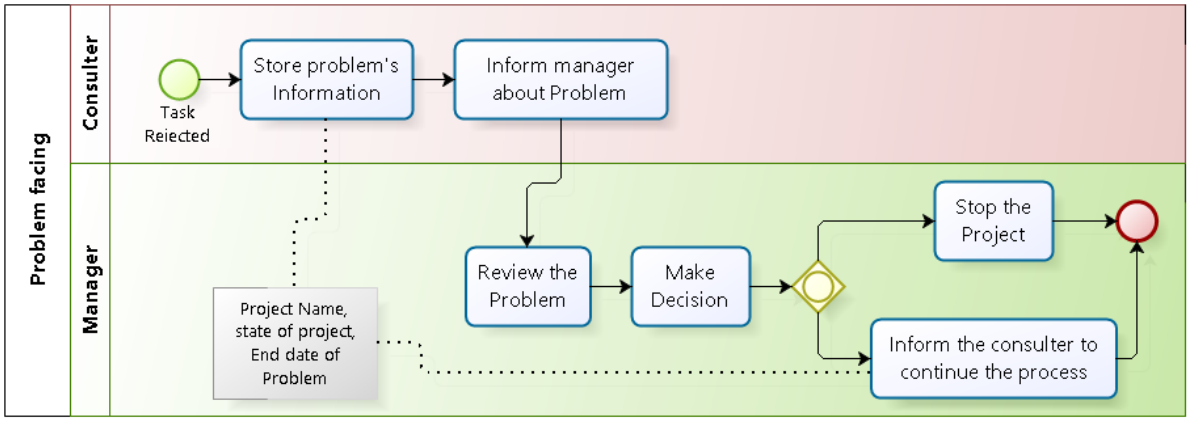

Figure 12-Problem Facing BPMN (To-Be model)

Leave Request

Since company is growing, in near future there should be a formalized way of leave requesting. In order to decrease employee's waste time for requesting and ease management of leaves, Project team developed the BPM represented in figure 12.

In next chapter integration of this process with a 'leave calendar' will be discussed. It will increase manager ability to decide about leave requests.

This process increase standardization, clarify the roles and decrease physical presence of managers according to their requirement (Req. 3, 4 & 8 in Table 9).

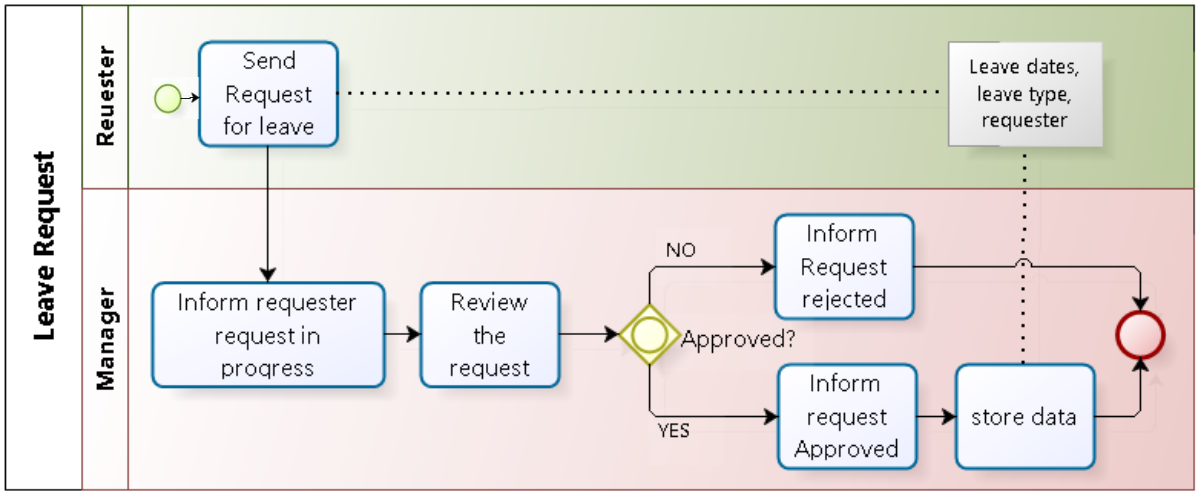

Figure 13- Leave Request BPMN (To-Be model)

Resource Emergency

Based on a business rule, this complementary process had been developed. It should be reminded that currently employees use a calendar dedicated to resource reservation to reserve desire resource for a specific duration of time.

One business rule in company aims to increase resource efficiency. Base on this rule, employees are able to request a reserved resource for a more emergent need.

Process of requesting a reserved resource was not designed, therefore project team designed its BPM. Figure 13 shows designed BPMN model.

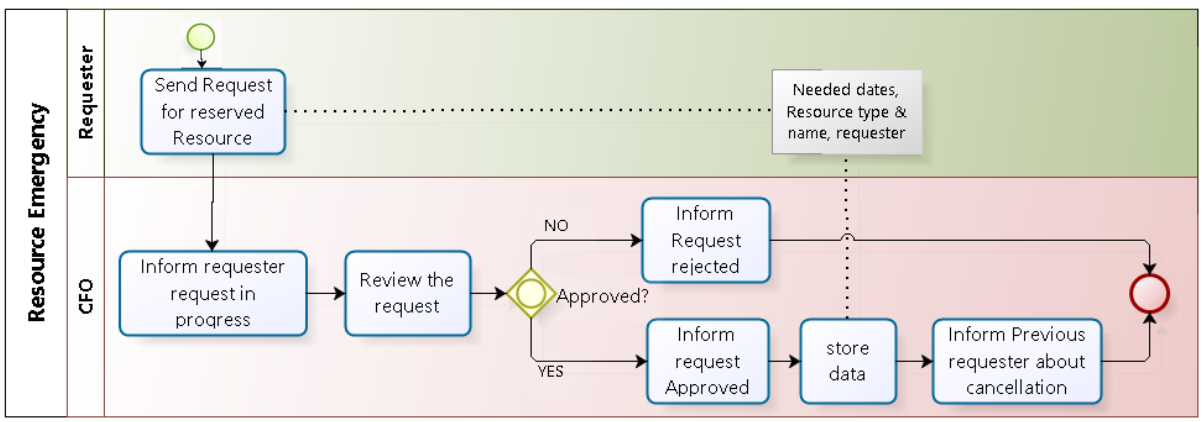

Figure 14- Resource Emergency BPMN (To-Be model)

4.2 Key Process Indicators (KPIs) development

Project team developed Several KPIs Based on meetings with managers in company, these KPIs will contribute managers to monitor operations.

KPIs contribute in two main objectives of project; increase transparency of operations and ease service management. Desired IT solution should be able to feed and retrieve these KPIs.

Table 12- KPIs Table

Area	*KPI*	*code*
Efficiency	Wait time between end of a client's POL project and start of its PMOL Project.	1-1
	Ratio between numbers of executed POL projects to accepted PMOL projects during last 6 month.	1-2
	Problems accorded during a project with their durations.	1-3
	Projects Durations.	1-4
	Durations of Steps in POL projects.	1-5
Effectiveness	Current Stage of each project.	2-1
	Accomplishment of project.	2-2
	Number of new Projects in last month.	2-3
	Number of renewed projects in a month.	2-4
Human Resource	Number of PMOL and POL Projects that a consulter is involved.	3-1
	Number of involved employees in each project	3-2
	Number of involved projects for each consulter during each month	3-3

After implementation of solution (fifth chapter), All these KPIs are achieved.

These KPIs are accessible in developed applications. Table 12 represents which part of IT in final solution presents each KPI.

Table 13- How to access KPIs in IT solution.

KPI CODE	*PART OF IT*	*KPI CODE*	*PART OF IT*
1-1	Client's Subpage	**2-2**	POL/PMOL Projects Lists (State)
1-2	POL List 'Continued?'	**2-3**	POL/PMOL Projects Lists (filtered by time)
1-3	Problems History list	**2-4**	PMOL Projects List
1-4	POL/PMOL projects Lists	**3-1**	Consulter Involvement List
1-5	POL State Measurement List	**3-2**	Consulter Involvement List
2-1	POL/PMOL Projects Lists	**3-3**	Consulter Involvement List

4.3 Specification of IT solution

Since company already subscribes the Microsoft SharePoint platform in office 365 online, project team focused on development of SharePoint 2013 platform of company to support To-Be models.

To increase productivity and decrease services lead-times, some parts of main operations should be done by IT system which means automation by IT. Therefore it is necessary to develop 'workflows' in company's SharePoint platform.

SharePoint platform is able to integrate information systems and extract data (logs) to feed KPIs. Therefore libraries and lists regarding operations should be developed to store files and data.

Project team decides to approach SharePoint development as a general IT development, because ideally in a BPR project execution team should not restrict itself in its re-design to a unique resource. They should specify their design then select one of existing alternatives in market.

Generally teams follow a plan consisted of three main layers to specify an IT solution; Conceptual architecture, Informational architecture and Technological architecture.

Conceptual Architecture

One of the approaches to understand an IT system is to represent it by use case diagram of UML.

Figure 14 represents most important use cases that stakeholders hope to receive by the new IT solution which allow them to solve existing problems.

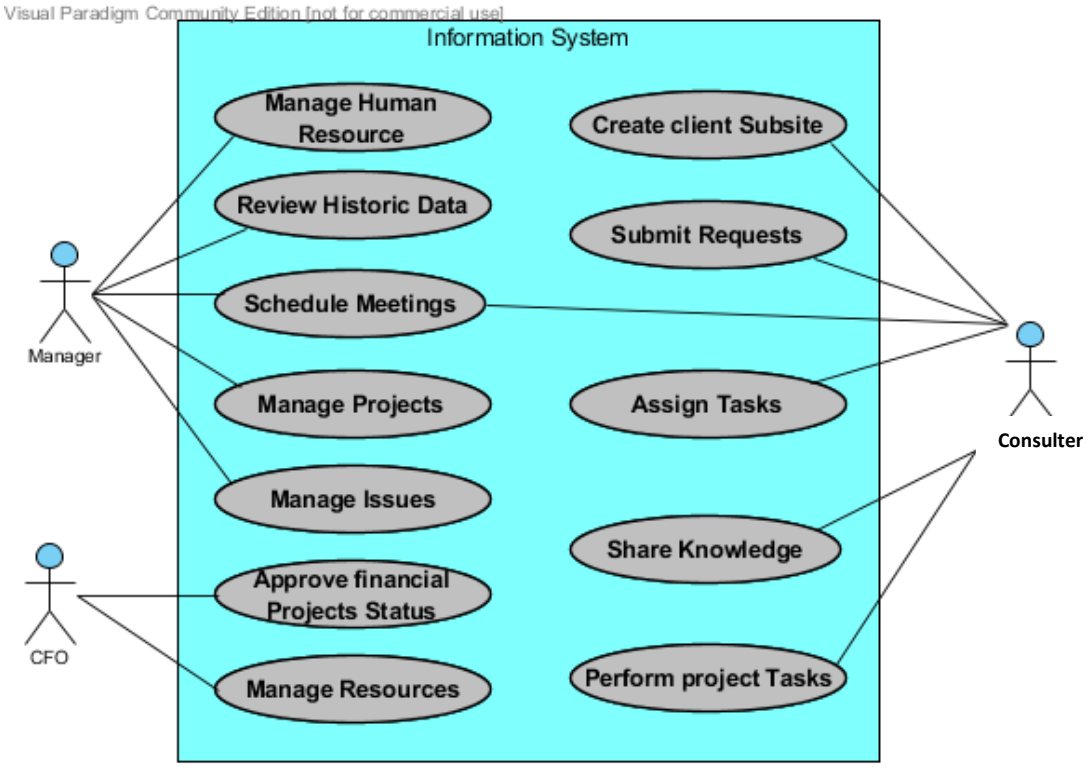

Figure 15- Use Case Diagram for desired IT.

In this diagram 'Manager' referred to both 'Leanked' and 'HM Consulters' managers.

CFO stands for Chief Financial Officer in this diagram.

In order to describe these use cases and their involvement in business activities, Table 13 had been developed.

Table 14- Use cases Descriptions.

Use case	*Explanation*	*Business operation*
Manage Human Resource	Managers need to know their employee capabilities and if they have time for new tasks. They need to review KPIs related to HR.	POL-PMOL
Review Historic data	Managers are interested to have access to information stored about Tasks Assigned with their outcomes and KPIs data in Effectiveness and Efficiency.	General
Schedule Meetings	To schedule internal meetings and meetings with clients there is a need to integrated calendar.	POL-PMOL
Manage Projects	To create a new project and review most important data about it and also Stop the project process.	POL-PMOL
Manage issues	As it is defined in 'Problem facing' BP, if a consulter face problem to accomplish assigned task, manager should be able to make decision about the task.	Problem Facing
Approve Financial Projects Status	In projects, CFO is responsible of approving financial status of a client in each project, therefore IT should inform Operation department about CFO decision and it should be stored in database.	POL-PMOL
Manage resources	Employees use shared resource. To make a reservation, related data should be stored, It could happen that a reserved resource be requested which CFO should decide on that.	Resource Emergency
Create Client Sub site	For each new Client, Team Leader should create a profile which in that subpage project team shares knowledge about this client.	POL-PMOL
Submit Requests	Information System should facilitate employees to submit their requests.	Leave Request-Resource Reservation
Assign Tasks	An employee could be assign to a task by workflow or another employee, this information should be stored.	General-POL-PMOL
Share Knowledge	IT should be able to store files and documents.	POL-PMOL
Perform Project Tasks	Employees assigned to different tasks should be informed about tasks and be able to store task outcome in IS.	POL-PMOL-General

A 'General' operation refers to group of operations which are not identified in contexts of this project, but they exist in company.

Information Architecture

Now the expectations of use cases are defined, it is necessary to determine business entities associated with Information System inside this IT solution.

One of common tools to represent this type of information about IT is UML Class diagram.

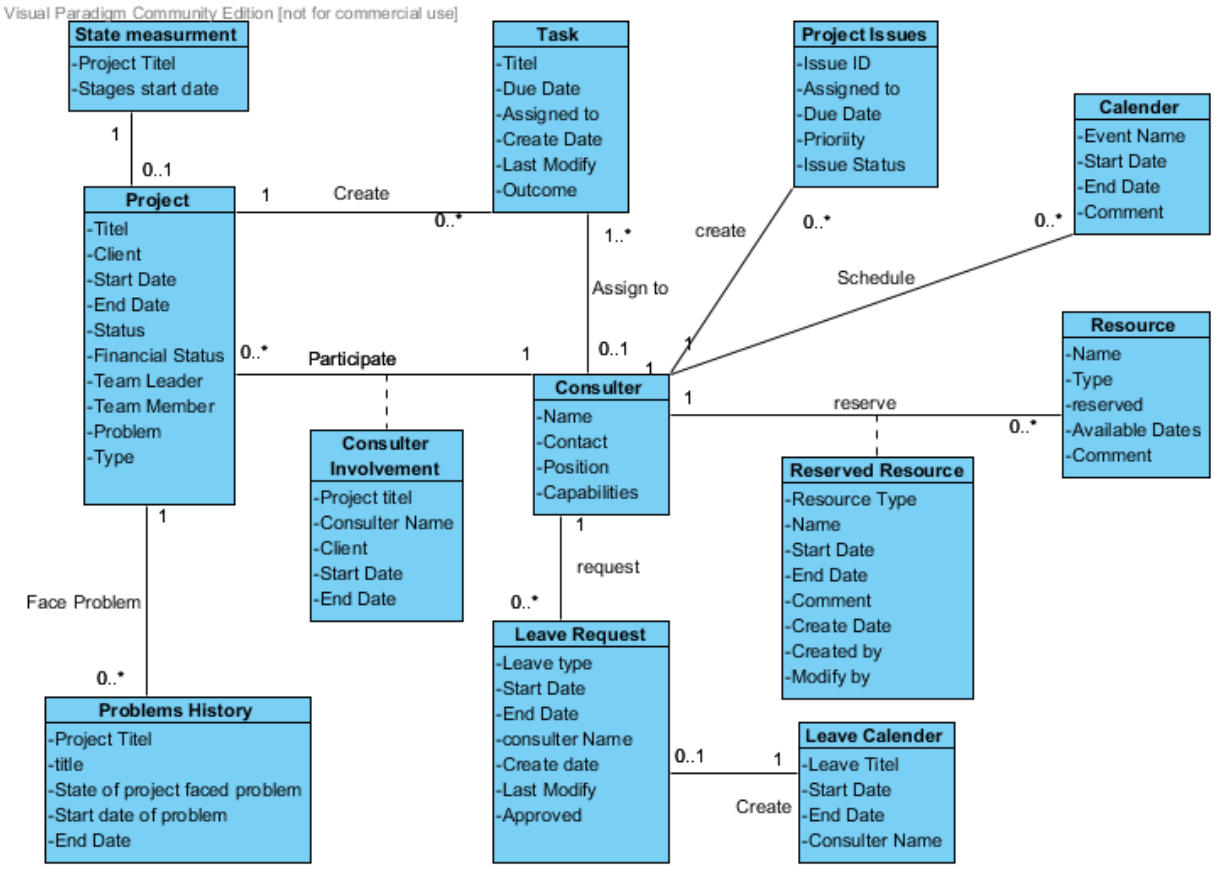

Figure 16- Class Diagram for desired IT.

Application Architecture

In the case of this project which is going to be implemented in SharePoint 2013 platform, definition of apps should be considered. Figure 16 represents basic kinds of apps for SharePoint; SharePoint-hosted and provider-hosted.

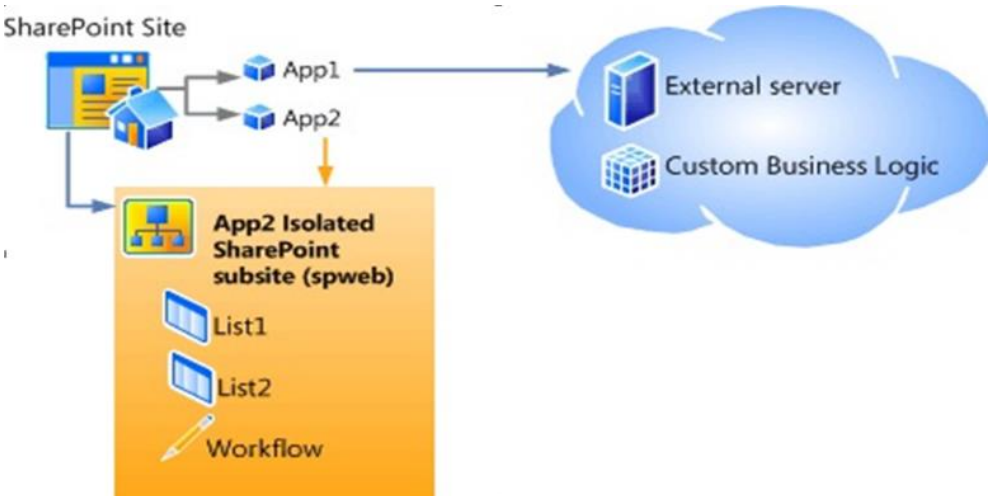

Figure 17- Main groups of SharePoint 2013 applications.

An App could be a predesigned App delivered to end-user by SharePoint (see figure 17, dashed cadre) or a customized app based on company business logic which deploy on SharePoint platform (see picture, simple cadre).

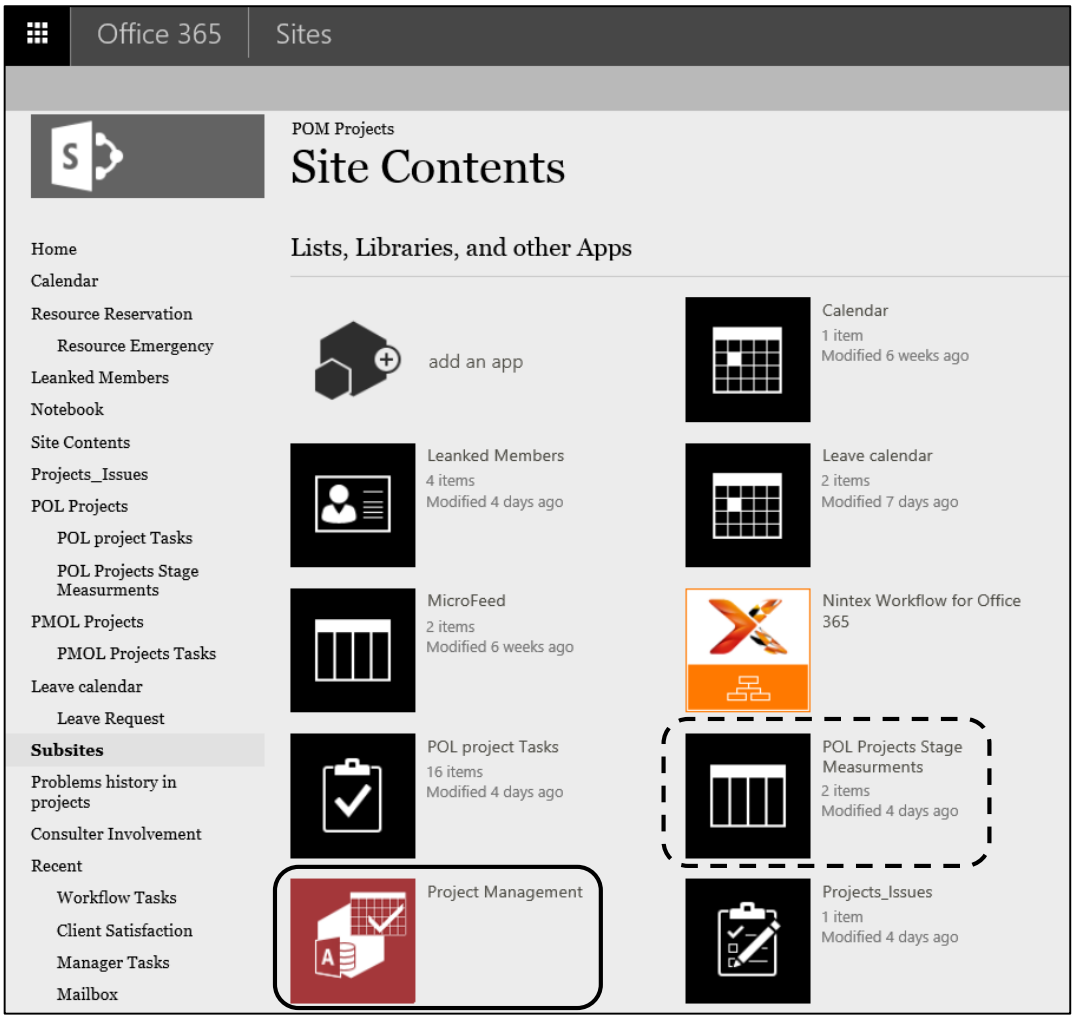

Figure 18- SharePoint user interface

A ‘list’ in SharePoint plays role of an application and user can add it to selected site by enabling it in ‘Site Contents’ of the site. (Figure 17)

When a list is added to platform, it gives user capability to add one or many workflows to each list. Team decides to separate workflows and lists to clearly present relations between components of desired IT solution in next component diagram.

Figure 18 represent Component diagram.

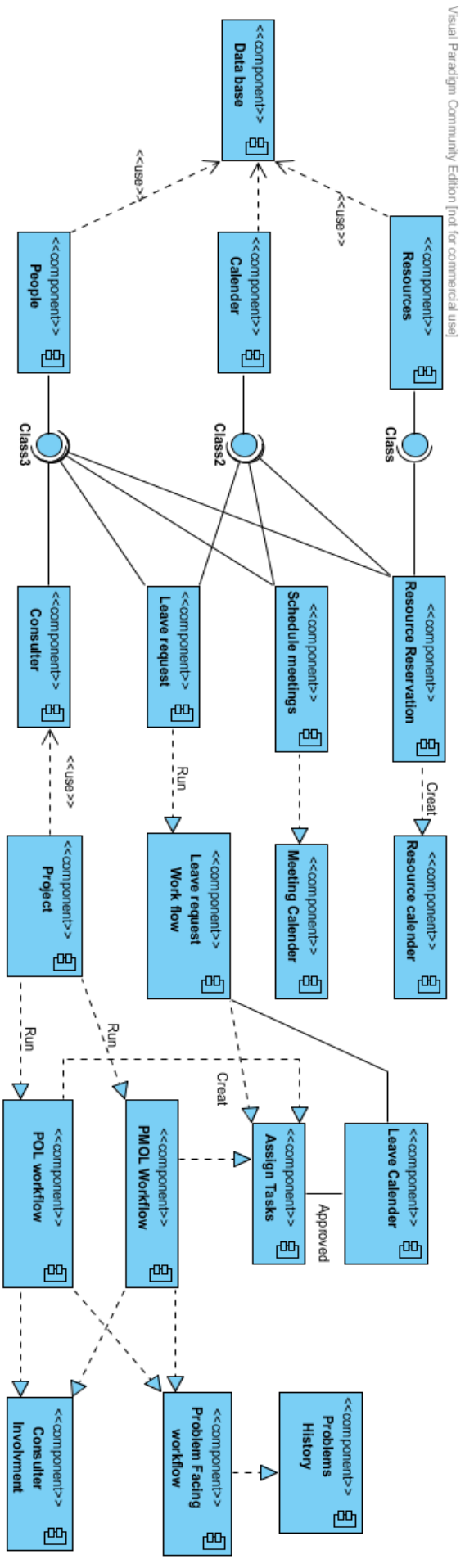

Figure 19- Component Diagram of desired IT solution.

Technological Architecture

SharePoint (platform as a service) is a platform that provides some basic applications and opportunity to develop customized applications, it has on-promises version and cloud version which last one is the case of company resource. Cloud based technology is summarized in Figure 19.

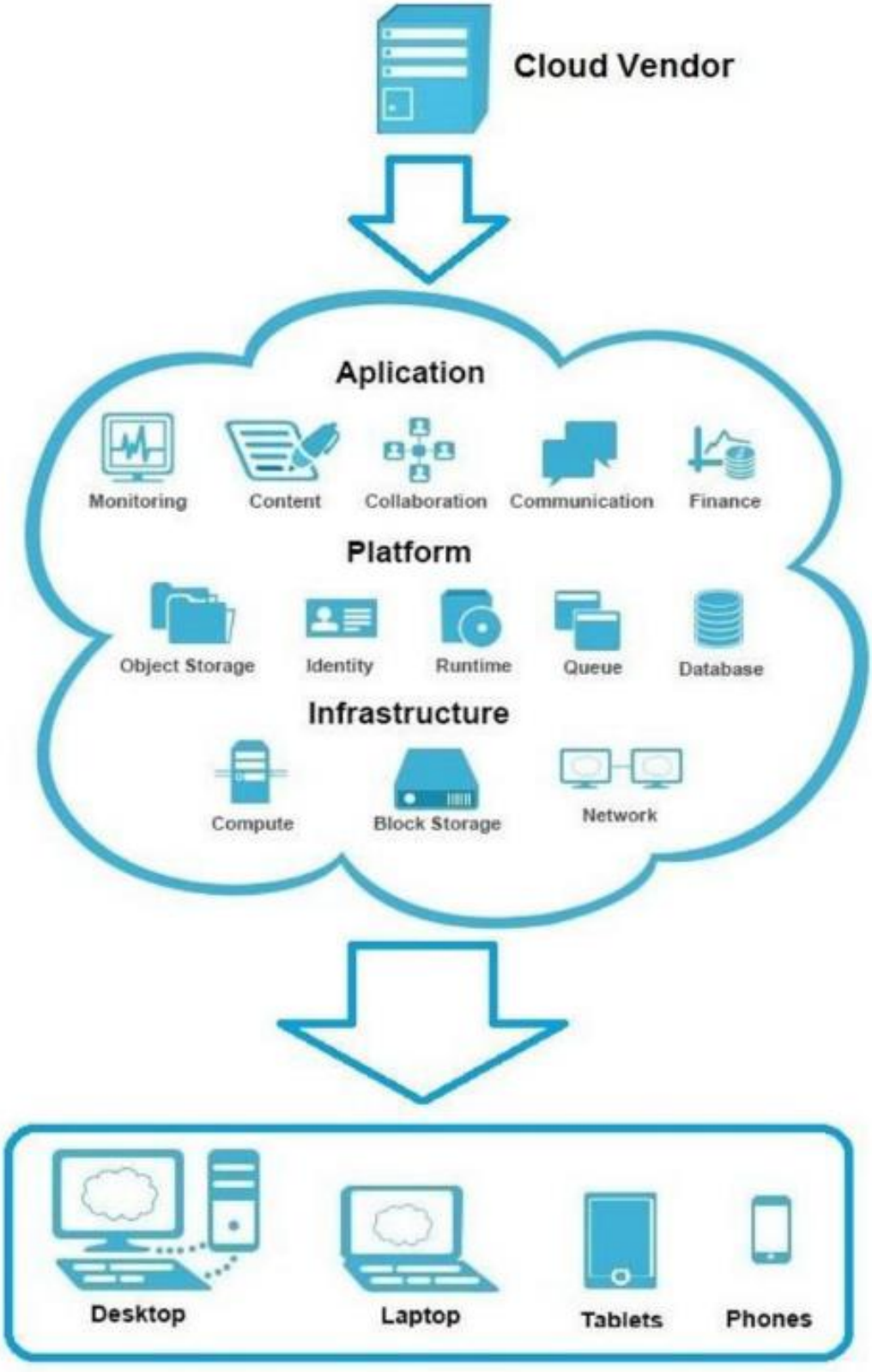

Figure 20- Cloud computing overview

U.S. National Institute of Standards and Technology (NIST) defines the service models of cloud computing as follows;

- Software as a Service (SaaS):
  - "The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings."
- Platform as a Service (PaaS):
  - "The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment."
- Infrastructure as a Service (IaaS):
  - "The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls)"

Figure 20, represents responsibilities regarding each service that a company choose to subscribe.(Chou 2010)

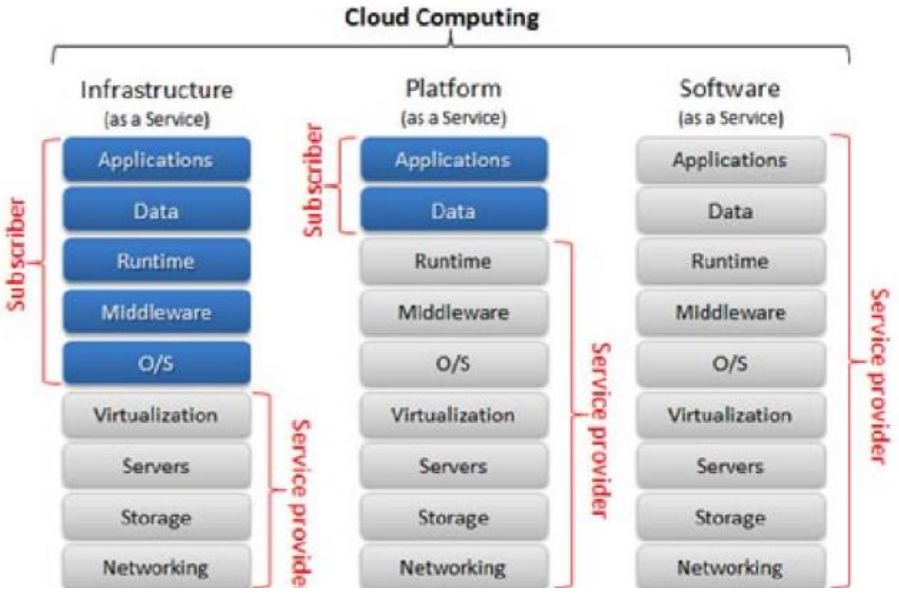

Figure 21- Separation of responsibilities in different cloud services.

Since company is benefiting from a PaaS of Microsoft, in terms of technological architecture company just needs to provide access to internet for employee's computers.

5 Solutions implementation in Microsoft SharePoint 2013

Based on specifications discussed in previous chapter, project team explained development of the solution in SharePoint of company in this chapter.

It should be mentioned that development takes place in a subpage of company's website to avoid risk of interruptions in daily operations.

Project team should follow the application architecture specified in pervious chapter (Figure 19) to provide functionalities based on use case diagram (Figure 15),

As it was mentioned before (Figure 18), it is possible to deploy applications from third party companies and save time to avoid developing the same functionalities. Therefore in this project 'Resource Reservation app' and 'Nintex workflows App' are deployed from third party companies available in SharePoint Store which are different from basic applications provided by SharePoint 2013.

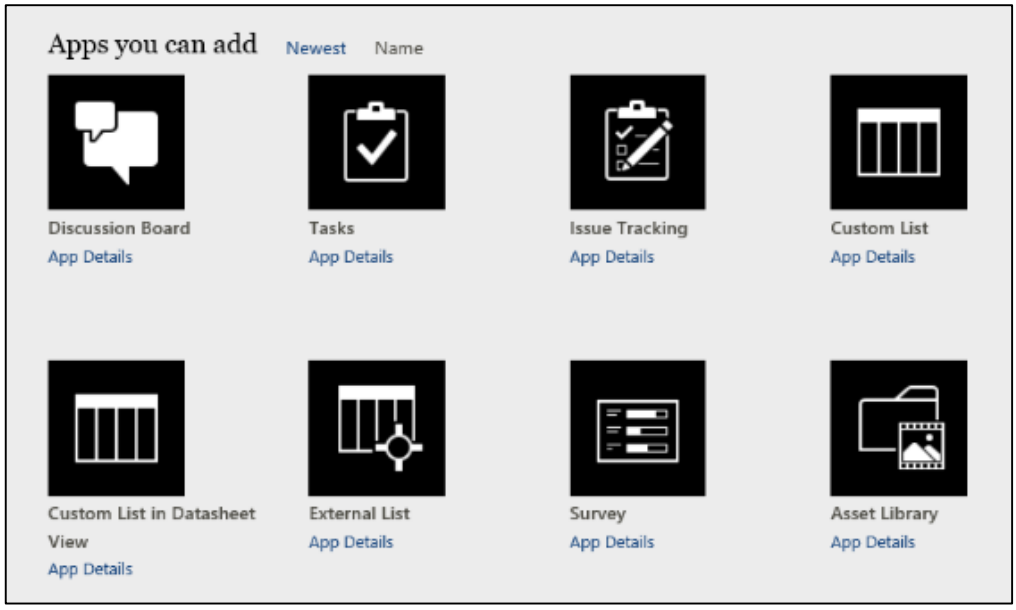

Figure 22- Some of pre-developed apps by Microsoft on SharePoint platform.

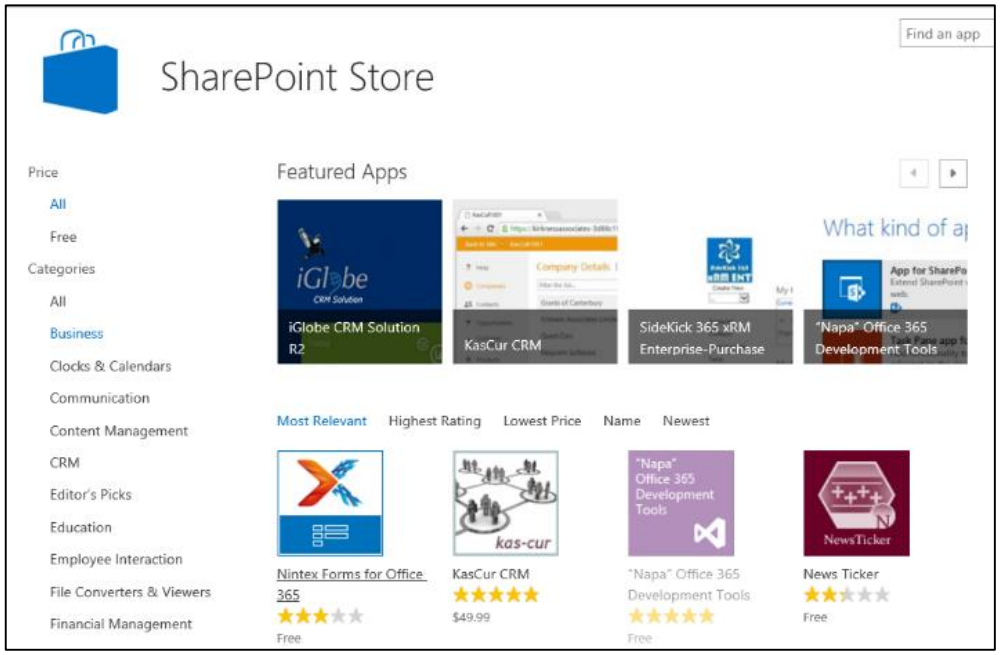

Figure 23- SharePoint store and some of its available apps.

Considering component diagram (Figure 19), applications network should be consist of following SharePoint Apps.

Lists;

- POL Project List
- PMOL Project List
- Leave Request List
- Consulter Involvement List
- Resource Reservation App and Resource Emergency List
- Problems History in Projects List
- POL Project State Measurements List

Workflows;

Workflows are considered as a capability of each list app but since some workflows affects different lists author decides to explain them separately.

- Leave Request Workflow
- Resource Emergency Workflow
- POL Projects workflow
- PMOL Projects workflow

Task Lists;

- POL Projects Tasks
- PMOL Projects Tasks
- Manager Tasks

Calendars;

- Main Calendar
- Leave Colander

Client's Subpage;

To increase collaboration in company regarding each of its clients.

5.1 Development of SharePoint Apps

In this section, each App is discussed. Pictures represent final user interface of each App.

Development starts with list Apps. After definition of all lists, workflows will be discussed then task lists and definition of different calendars.

Finally representation of Client subpage which plays significant role to achieve collaboration goals will close this section.

Lists

POL Project List

Based on Class Diagram and Component Diagram, a list app had been customized to help management team to start a POL project by creating an item in this and further on monitor the project. Figure 23 shows this app user interface.

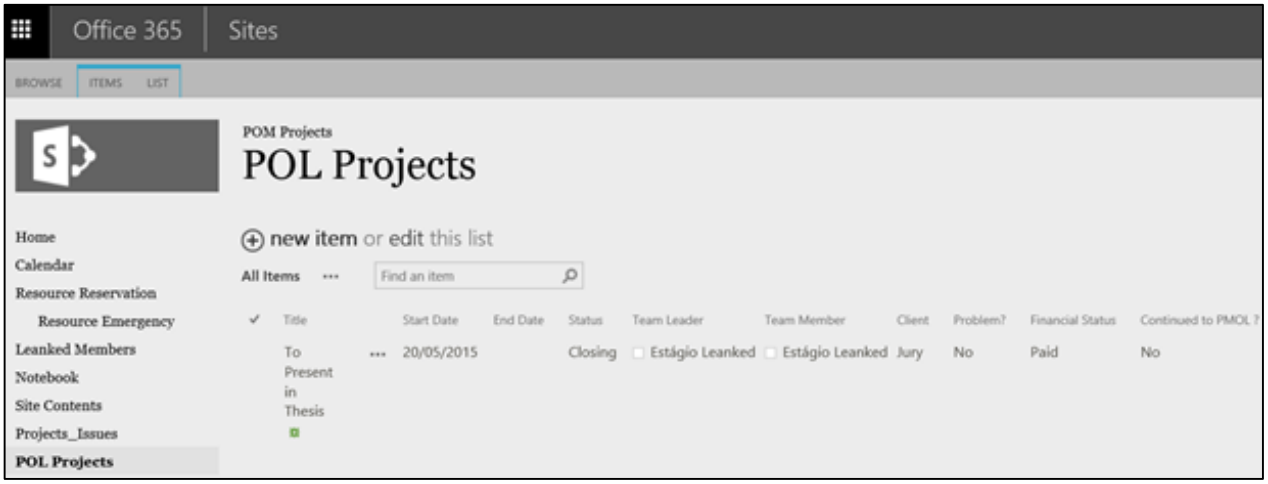

Figure 24- POL Projects List

As it is clear in picture, Manager can trigger a new project by clicking ‘New Item’ then user will select ‘Team Leader’, ’Team Member’, ’Title’ and ‘Client’.

‘Start Date’, ‘Problem?’ and ‘financial Status’ were field by default values respectively ‘Today Date’, ‘No’ and ‘not paid’.

Also there are columns which Pol workflow edit them. Workflow logs update these columns and help manager to monitor changes in situation of each project. These columns are ‘End Date’ of project, ‘Problem?’ and ‘Financial Status’.

It should be mentioned that this list and its workflow contributes to solve problems one, two, four, six and seven according problems list (See Table 10).

PMOL Project List

Very similar to POL project list, another list is developed for PMOL projects. Similarities between these lists attributes caused that in the Class Diagram just one class called ‘Project’.

It should be considered that the workflows associated to POL and PMOL are developed base on their BPMN models which makes them different.

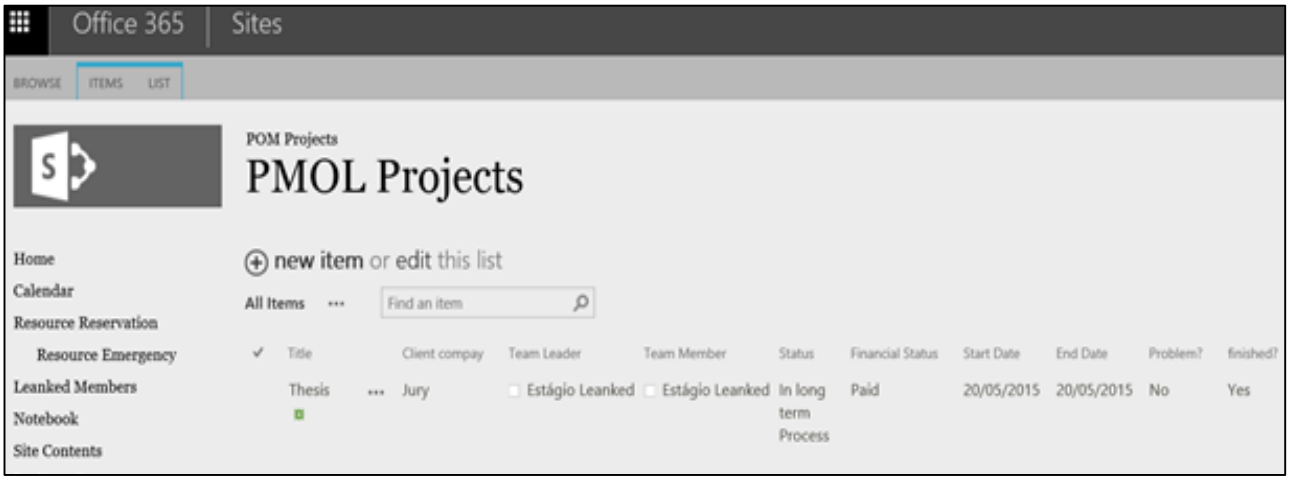

Figure 25- PMOL Projects List

Leave Request List

One of the Apps developed is this list to standardized connection of employees with management team.

This list app is used to submit leave requests. Employee adds a request and requester will receive an email about approval or rejection of the request after manager's response.

Also this list is a good reference for management team to monitor leaves requests with their reasons.

Figure 25 presents user interface of this app, oval represents outcome of decision by manager.

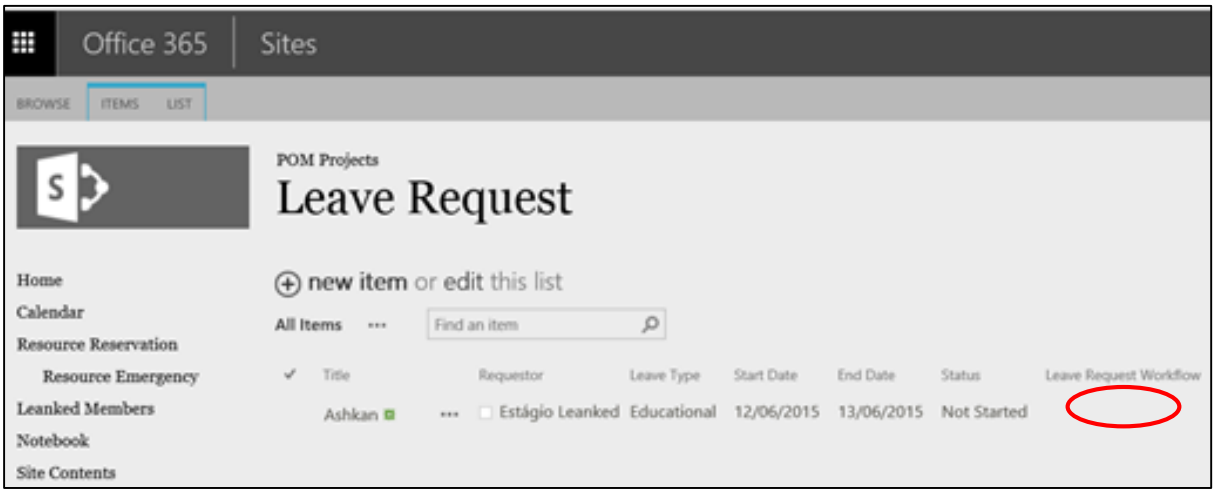

Figure 26-Leave Request list

Consulter Involvement List

In terms of Human Resource Management, managers are interested to monitor their employee's involvement in different projects. This list is developed to present different KPIs (3-1, 3-2 & 3-3 in Table 13).

'Consulter Involvement workflow' associated with both POL and PMOL lists updates this list App. When manager chooses 'Team Leader' and 'Team Member' in project, two new items added by workflow to this list consisted of 'consulter's name', 'Client' and 'start date'.

'End date' is added by POL or PMOL workflow at the end of project.

Based on this list, there will be more opportunities to evaluate consulter's productivity and even define motivational methods in company.

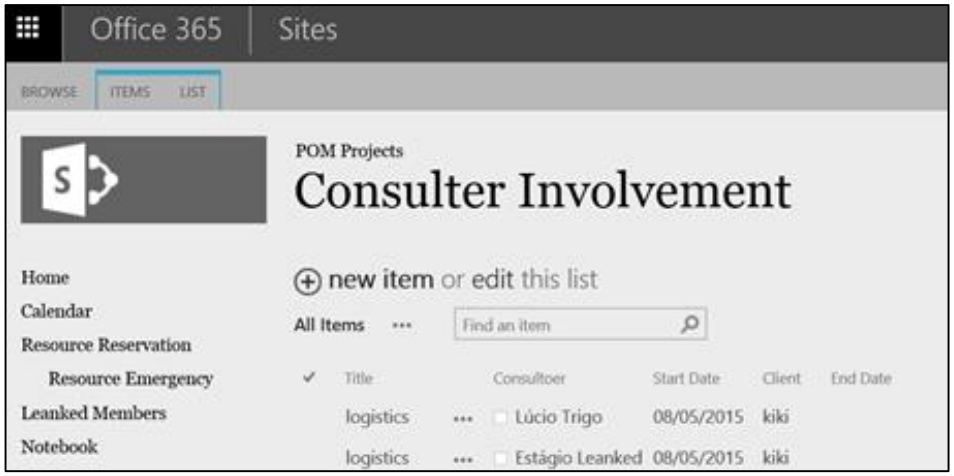

Figure 27- Consulter Involvement List

Resource Reservation App

In order to facilitate company Resource Management a developed App is outsourced, the App is free and available in SharePoint Store (Figure 22). This app consists of three lists and provides resource reservation capability.

This application allows definition of resources in different categories. Customizations had been done in this app to match company resources.

Also it solves the problem of reserving unique resource by different consulters in same time.

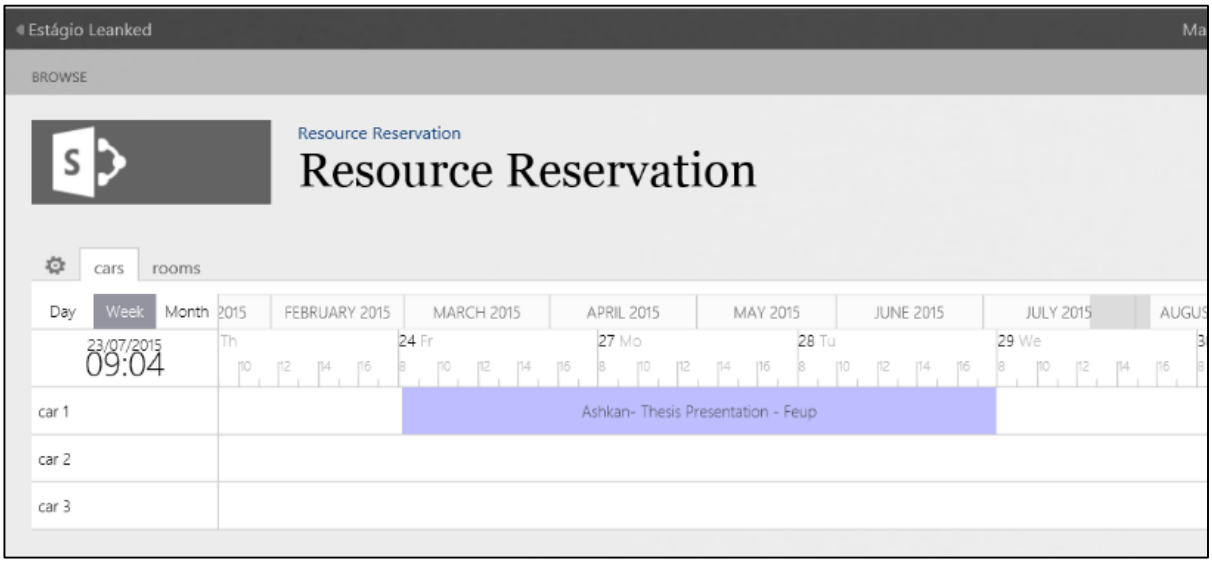

Figure 28- Resource reservation App

Resource Emergency List

This app facilitates employees to request a reserved resource base on priority of their needs, therefore they can submit and receive result of their request. Requests will review by financial department (CFO) to make decision to optimize resource efficiency.

This list have strategic value as well, manager can understand the most needed resources during year and manage their resource acquisition.

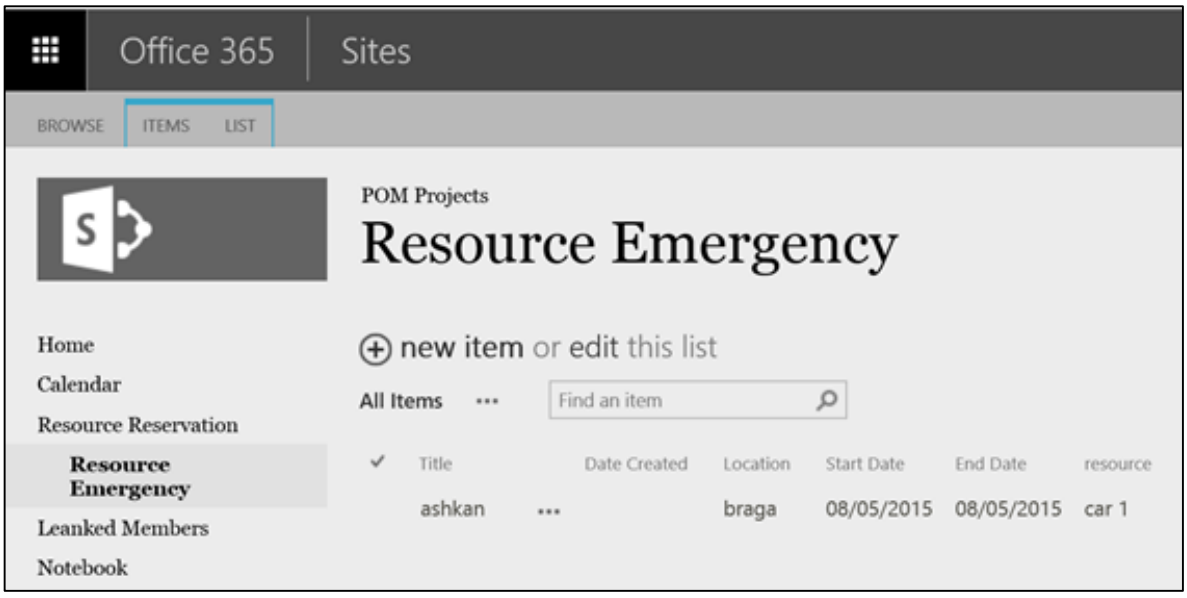

Figure 29- Resource Emergency List

Problems History in Projects List

IT can be designed to sense the environment of company and its operations. Similar to human body nervous system. Therefore well-designed IT is capable of indicating problems.(Gates 1999)

Company's IT designed to not only supports daily operations but be capable to track problems in projects. It tracks problems by storing and presenting data about problems.

Management can decide based on patterns of these problem's data to start new improvements in operations either BPR projects or continues improvements.

This list App is a reference list, POL and PMOL workflows feed it to store data about problems accorded in project's activities. In addition this list represents problem's duration in a project to management team (KPI 1-3, Table 12).

Figure 29 represents data about problem indicated in figure 38.

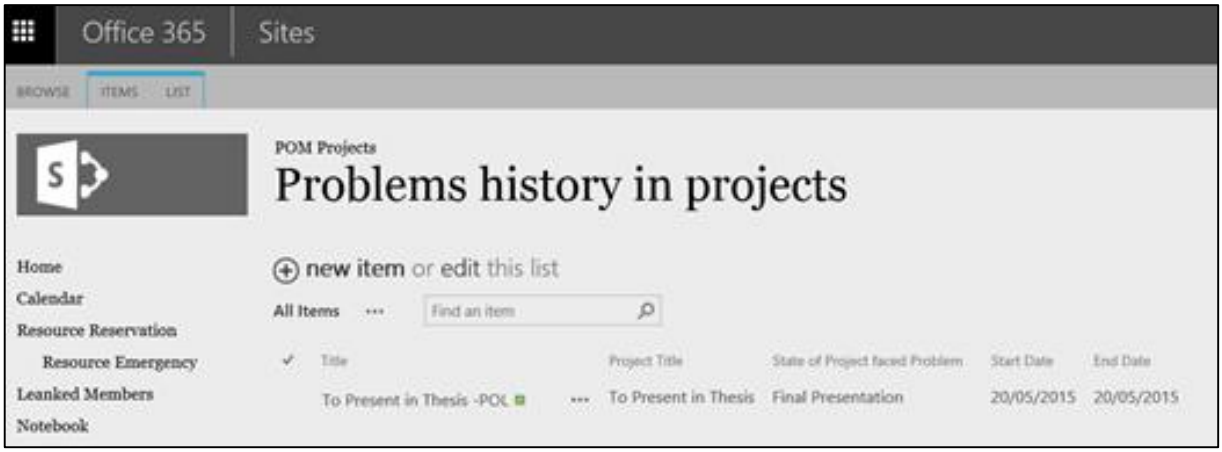

Figure 30-Problems history in Projects List

POL Project State Measurements List

Since lead time of a POL project has a direct relation to service quality and information about delays has value in terms of indicating problems in operations, this list app customized to keep track of each general step start date in a POL project.

Workflow of POL feeds this list automatically. Project team divides all POL activities into six groups according to relations of activities. (See Figure 35)

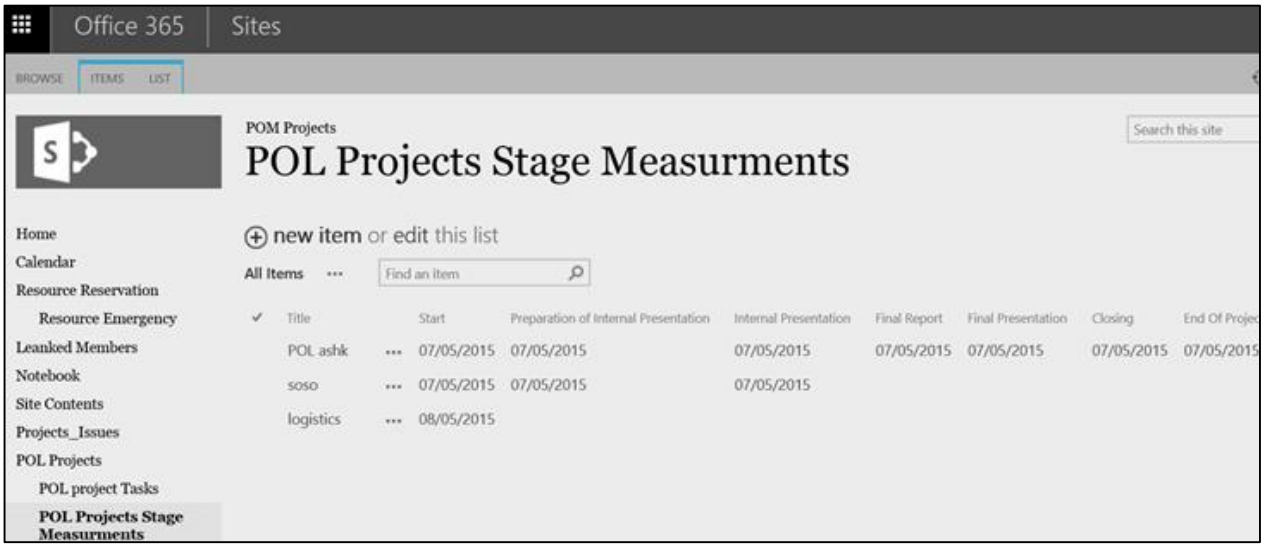

Figure 31- POL Projects State measurement List

Workflows

List workflows are developed for main lists, although they are able to modify other lists as well. As it was mentioned in chapter 4, project team developed five workflows to support To-Be models automation, these workflows will be discussed in this section.

In Appendix A some pictures of these workflows with higher resolution is available.

Consulter Involvement

Both POL and PMOL lists have this simple workflow which perform its duty at the beginning of a project automatically by adding a new Item to these lists. This workflow feed Consulter Involvement list based on data imputed in POL or PMOL lists for 'Team Leader' and 'Team Member' by manager.

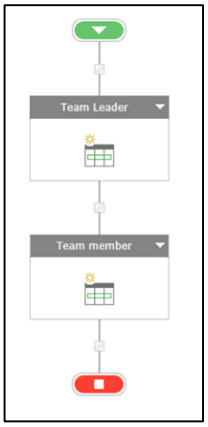

Figure 32- Consulter Involvement List Workflow

Leave Request Workflow

This workflow is developed to automate Leave request submission to management team and informing requester about the results.

In addition, this Workflow is associated with 'Leave calendar' to create events for accepted requests.

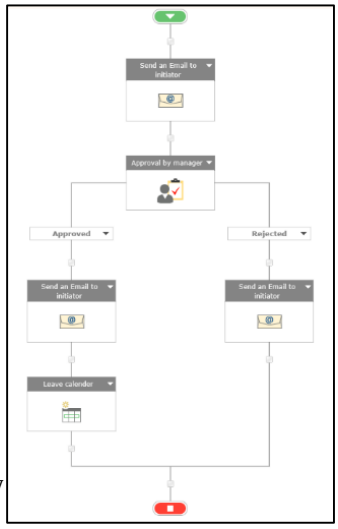

Figure 33-Leave Request List Workflow

Resource Emergency Workflow

This workflow automates communication of request for resource and its result.

If the financial department approve the request, workflow will inform the previous requester that the resource is not available for requester in the requested date.

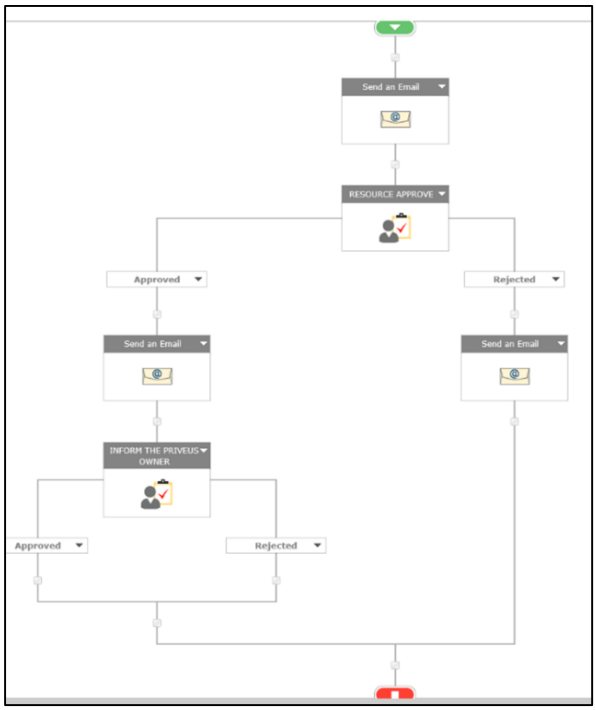

Figure 34-Resource Emergency List Workflow

POL Projects workflow

Communications and tasks assignments are automated for all activities in a POL project by POL Workflow. This workflow is longer and more complicated than previous workflows, since POL BPMN model is more complex. Figure 34 shows structure of workflow.

Adding a new item to POL list triger workflow, workflow finishs when the invoce and purpposal of PMOL had been sent to client. Assigned tasks by this workflow store in 'POL Project tasks list', Tasks Lists can be filtered by 'Project Title' or 'Consulter Name'.

Workflow picture is not clear. Author aims to show the structure of workflow and gives reader an idea about the size of this workflow, more details about workflow is in Appendix A.

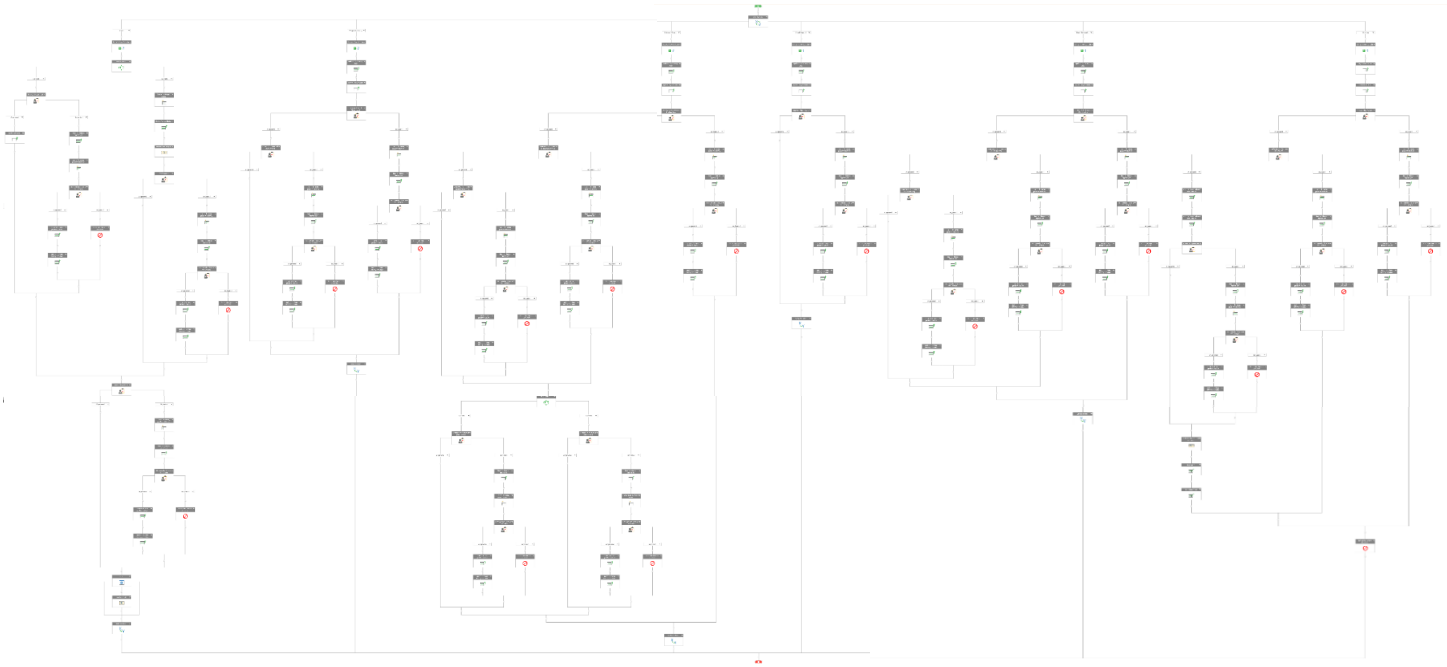

Figure 35- POL Projects List Workflow

Problem facing workflow

'Problem facing' model is developed to increase automation and standardization of operations.

This workflow will, inform manager about the accorded problem, create a task for manager in project's task lists and store data about the problem in 'Problems History in Projects List'.

At beginning of design team developed this workflow as a State in state machine inside POL and PMOL workflows. Therefore if project face problem in each activity the state of workflow is changed to 'problem state'.

During usability tests, project team realized that there was a problem in workflow. After solving activity's problem by manager, workflow start the same state of problematic activity from beginning. It caused overdue activities in project. Therefore team decides to integrate each activity with a problem facing part.

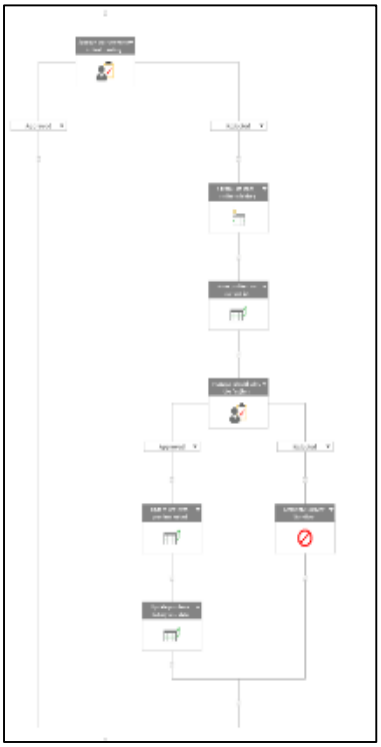

Figure 36- Problem facing workflow integrated in POL and PMOL workflows

PMOL Projects workflow

Similar to POL workflow, this workflow plays the role of main automation enabler in PMOL projects. It provides logs to list App to facilitate the monitoring of project execution by manager.

A PMOL project is divided into; short term and long term steps. There are two loops in long term step for repetitive activities. (See cadres in figure 36).

Team leader finishes this workflow manually. It can be finished by changing 'finish?' Column from 'No' to 'Yes' in PMOL list.

Figure 36 represents PMOL workflow structure.

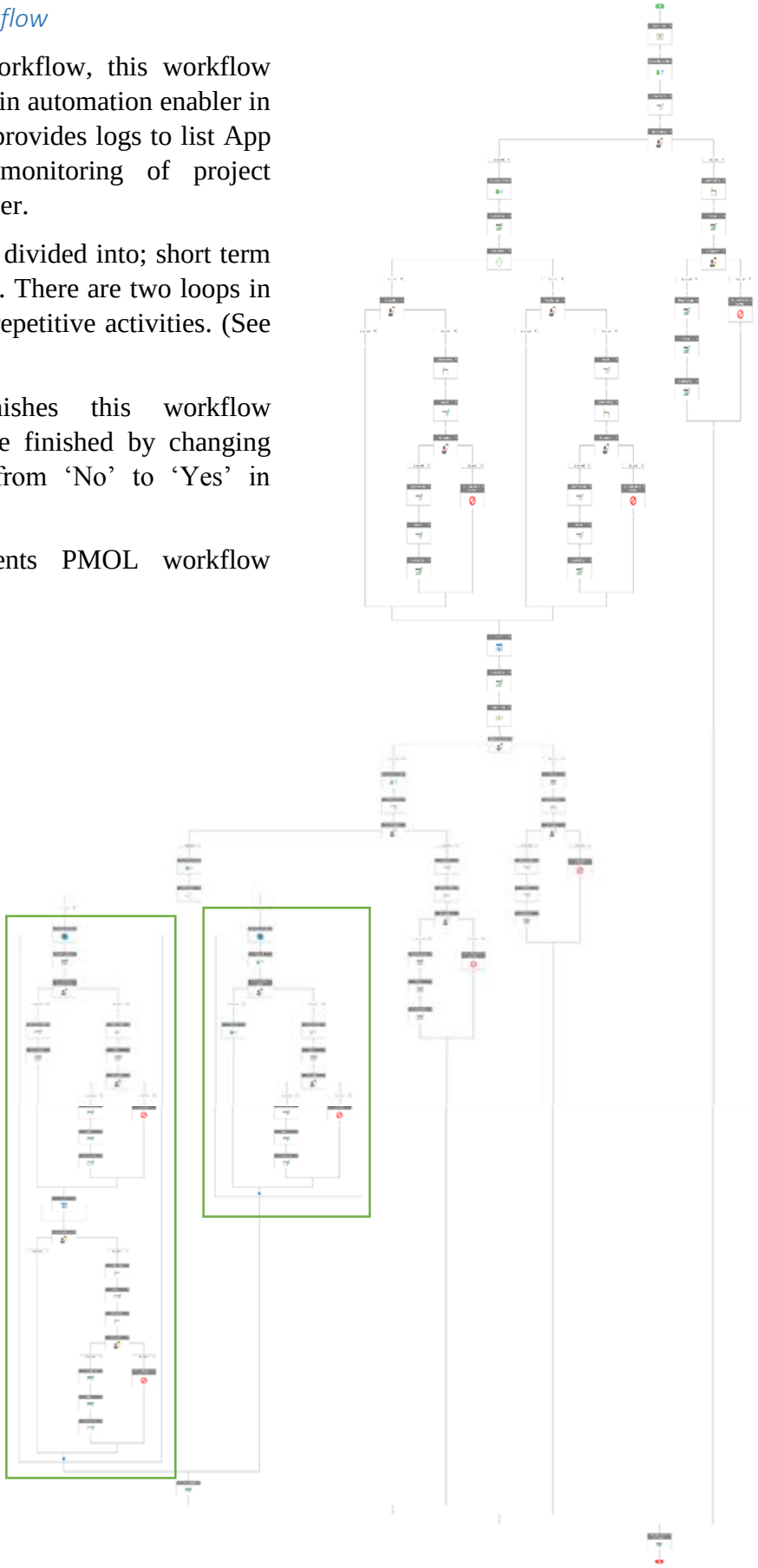

Figure 37- PMOL List Workflow

Tasks Lists

Employees and workflows assign Tasks, these tasks will be stored in tasks lists. Then assignee should approve or reject the tasks, as a result the project continue or stop.

team indicate one task class In Class diagram (Figure 15), but in project implementation team customized three different tasks lists to track tasks simply by the type of operation.

Task list is capable to present tasks based on ‘assignee’, ‘project title’, ‘create date’ and ‘outcome’.

Also tasks lists are able to identify the duration between tasks creation and modification by assignee. Therefore management team can have better understanding of employee’s productivity or find more details about problems in tasks lists.

POL Projects Tasks

This task list stores tasks created by POL workflow.

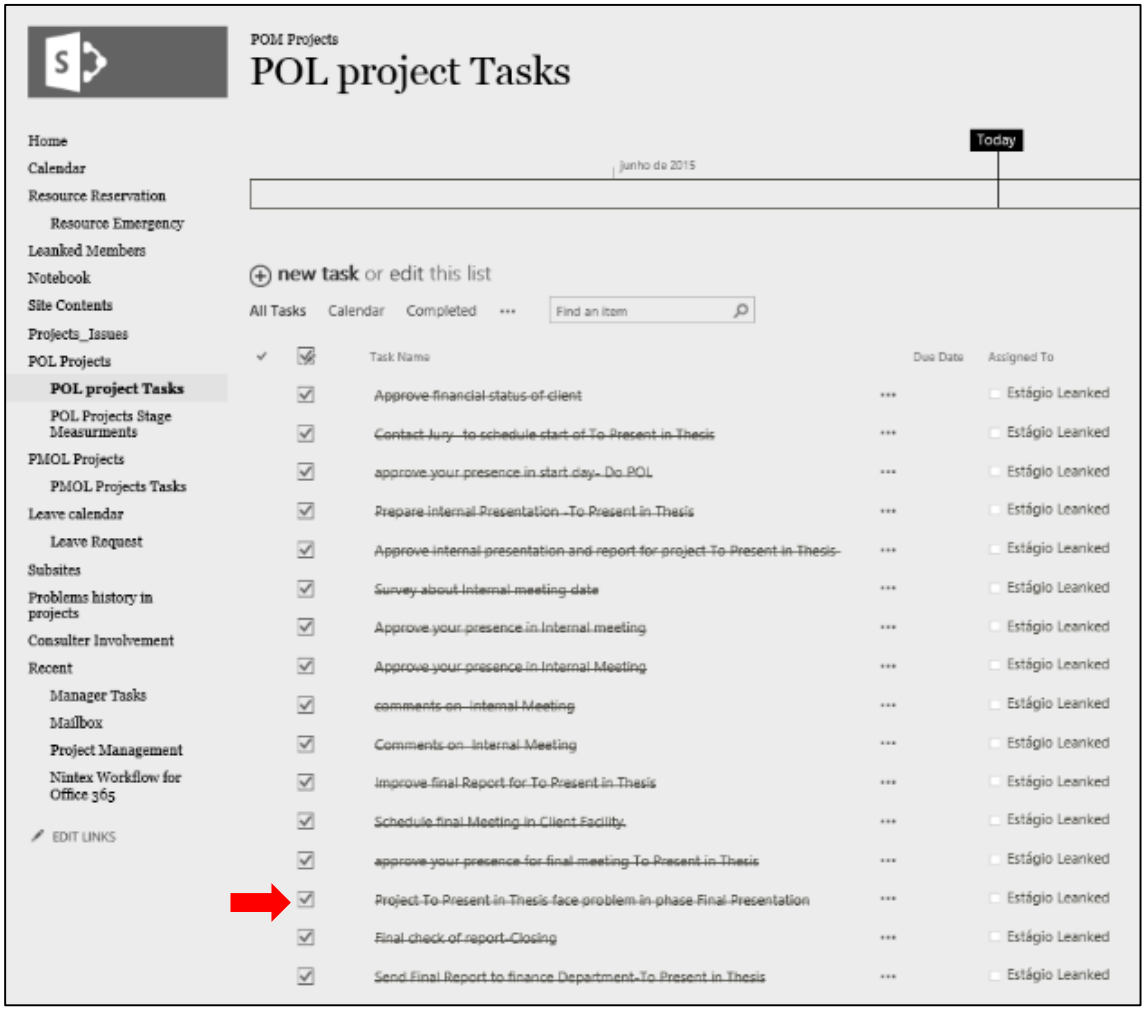

Figure 38- POL Project Tasks List

Arrow signs a created task for manager to solve, consulter rejected previous task therefore workflow created a new task for manager. Title of created tasks because of problem, follow this format:
‘Project [Current Item: Title] face problem in phase [Variable: Step]’

All these tasks (a set of created tasks for a POL project) are assigned to same person (Estágio) to avoid disturbing stakeholders with emails created by workflows during development and tests.

PMOL Projects Tasks

This tasks list stores tasks created by PMOL workflow.

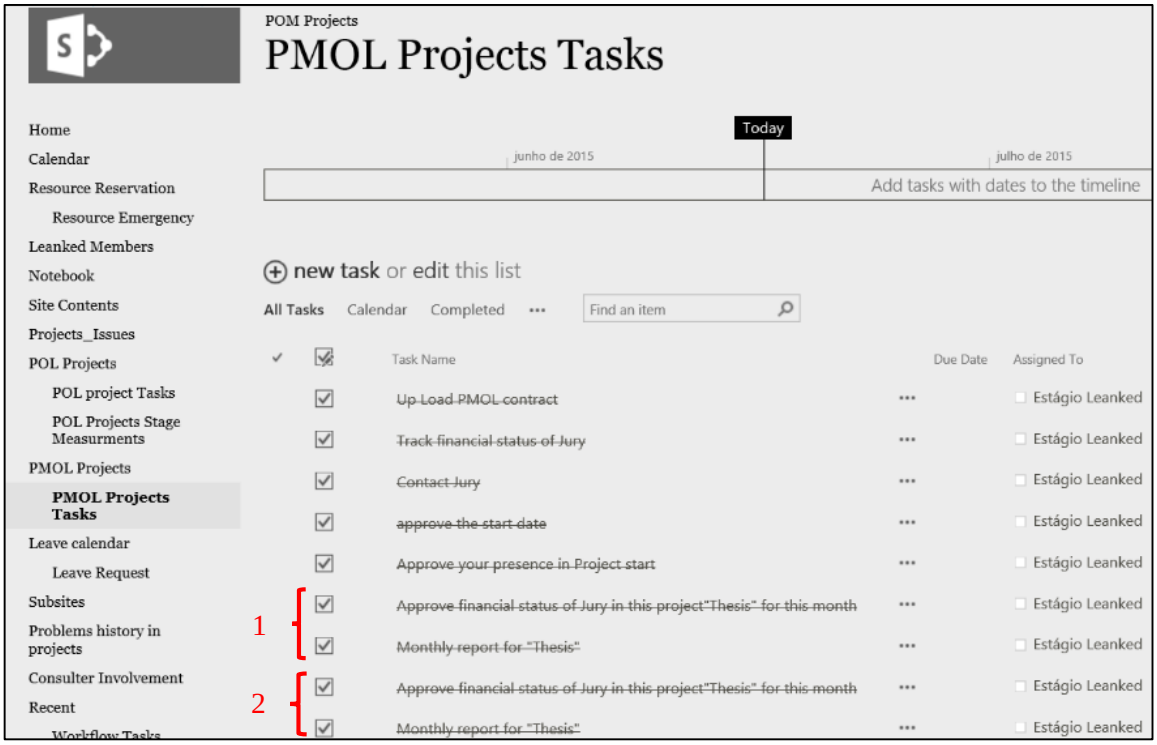

Figure 39- PMOL Project Tasks List

As it was mentioned before, PMOL workflow base on project long term feature has loops; therefore some tasks are created repeatedly (see 1, 2 in figure 38).

Manager Tasks List

Currently 'Leave Request' and 'Resource Emergency' workflows store tasks in this list App. in future if team develop other workflows related to management team, tasks will be stored in this tasks list.

Calendars

These Apps play significant role to organize the company. This section will discuss two calendars that were developed in implementation phase.

Leave calendar

This calendar is developed to ease management of leave requests.

Leave Request workflow feed this calendar. It helps decision maker to accept or reject leave requests base on already accepted requests for specific duration.

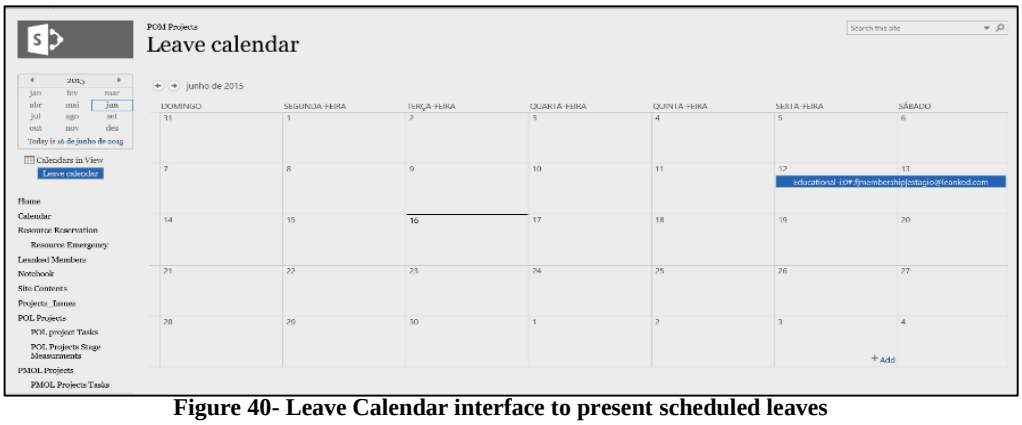

Figure 40- Leave Calendar interface to present scheduled leaves

Calendar (Main)

Employees will use this calendar to schedule internal and external meetings in To-Be operations, but it can indicate more types of events such as birthdays of employees.

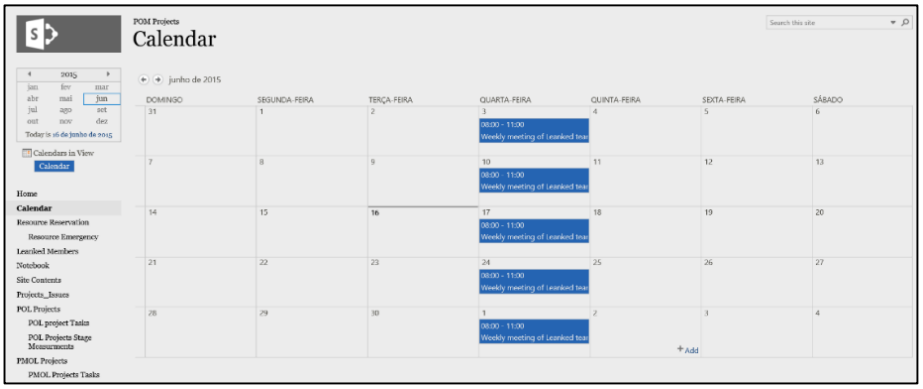

Figure 41- Main Calendar

Client's Subpage

To-Be model should ease knowledge sharing about client and projects to increase service quality. For each new client in POL project, 'Team leader' should create a subpage that will contain all specific information about client's POL project.

The same subpage will be used if client continues to PMOL project. Therefore if Project Team is changed, new team have access to previous information about client.

A Subpage template is developed to ease the creation of new subpage. This template contains different forms and checklists about each activity that will decrease human errors. They also increase standardization in clients' subpages and documents in them.

In addition, Apps like 'Picture gallery', 'Document Library', 'Newsfeed', 'Project summery', 'Calendar' and 'Mail box' are included inside this subpage template.

Left Brace indicates some of documents templates. In order to increase standardization these documents are provided for stakeholders to fill.

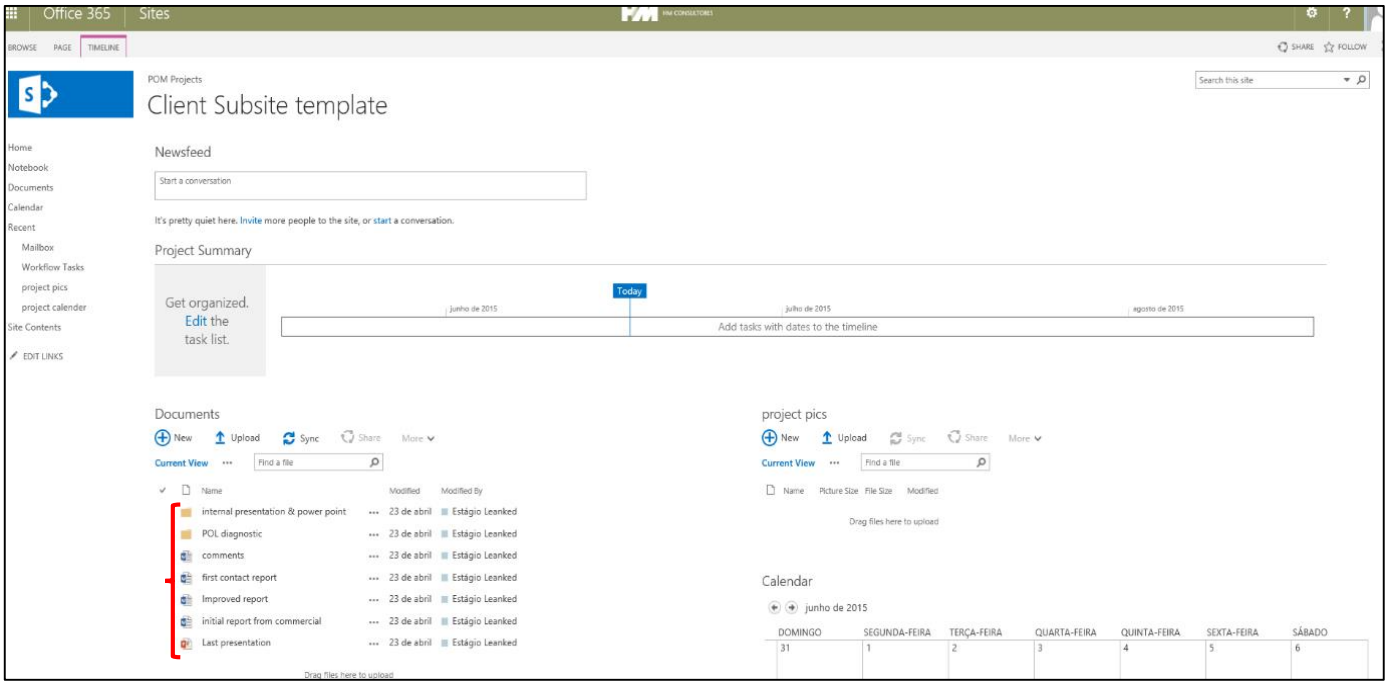

Figure 42- Client's Subpage

6 Conclusion

Achieved objectives and further work are discussed in this chapter.

6.1 Achieved Objectives

Project initial objective were to increase service quality. In order to achieve this goal, company conduct a BPR project for main internal operations.

Team starts to understand As-Is model, analyzed it and find problems (Chapter 3). Then To-Be models developed without As-Is model problems (Chapters 4 & 5). Implementing To-Be models will increase quality of service.

In this BPR project, team restructure BPs and used capabilities of IT (SharePoint).

Figure 42 is similar to Figure 1 that had been used to present goals in first chapter. Figure 42 shows more details about how sub goals are achieved by team. All goals of project were achieved;

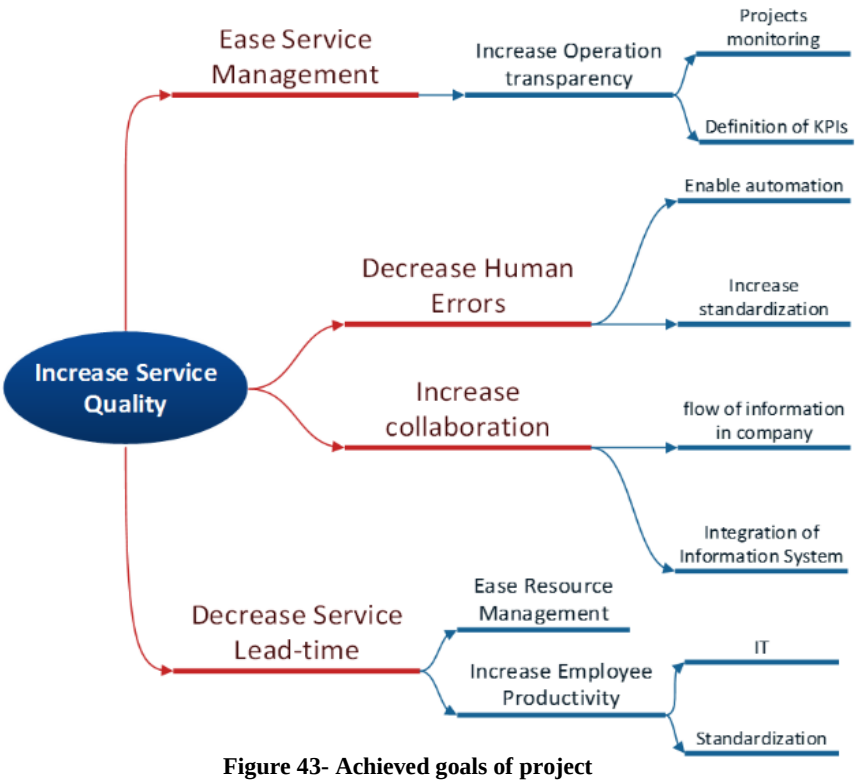

Figure 43- Achieved goals of project

Ease service management:

Workflows are developed to feed defined KPIs and updates projects status and lists with real-time data. Therefore management of projects, tasks and roles are possible and easier.

Decrease human errors:

Operations and roles are well defined, tasks assignments are automated even reminders are set, forms and checklists are developed and high quality information is more accessible. Therefore standardization will increase and human errors will decrease.

Increase collaboration:

SharePoint websites ease flow of information between employees and departments. Standard operation developed for collaboration between departments, moreover use of client subpage will increase collaboration in teams.

Decrease service Lead-Time:

Increase of employee productivity because of; standardization, use of IT, less human errors and better operations management will lead to faster service delivery.

Also resource management that seems as a bottleneck in some projects had been redesigned and optimized.

Other outcomes of project:

- ✓ Power of assigning tasks and tracking employee's activities caused good potential to define new business rules and motivational plans. For instance if an activity waits for consulter approval, consulter should reject the task.
- ✓ Designing the system to track projects problems and indicates states lead-times initiate future improvements. Company could change its BP to eliminate a repetitive problem.
- ✓ Operations documenting eases new employee integration in company. Since roles and activities are clear.

6.2 Further work

It is possible to divide further work in company into three main parts;

First; although To-Be model is designed and tested. But since workflows were designed by a middleware from a third party company (Nintex), company should subscribe the license to benefit from To-Be Model completely.

Economically suitable approach is to design developed workflows in Microsoft SharePoint Designer. As during project it had been done for 'Leave Request' workflow that first designed by Nintex and then developed in Designer and implemented.

Therefore as first step, company should implement model have been developed in this project.

Second; HM Consultores Company is looking forward to execute similar projects in its departments based on success of project in Leanked.

Currently operations mapping of Commercial department had been started. Its model will be integrated with Leanked's operations to reach higher integration and automation in company. (see Appendix A)

Third; SharePoint could be design to support different functions, such as Customer Relationship Management functions, therefore company may consider to insource these kind of systems by developing its SharePoint.

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Appendix A

Different materials to support discussion of dissertation are presented in this section.

Since workflows in thesis could not be clear because of their size, in this section reader can look at pictures with higher resolution of ‘POL’, ‘Leave Request’ and ‘Resource emergency’ workflows. Numbers in cadres represents page numbers that represents each part.

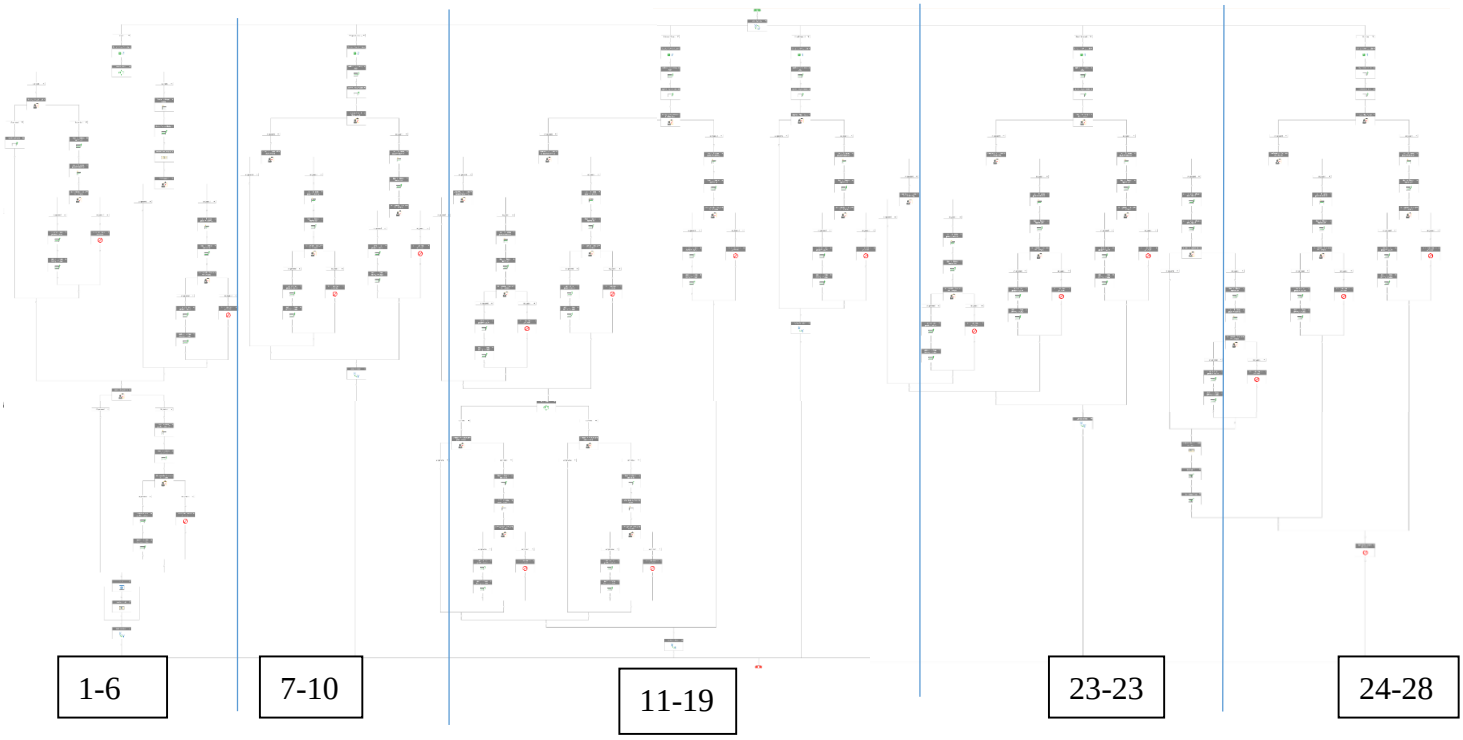
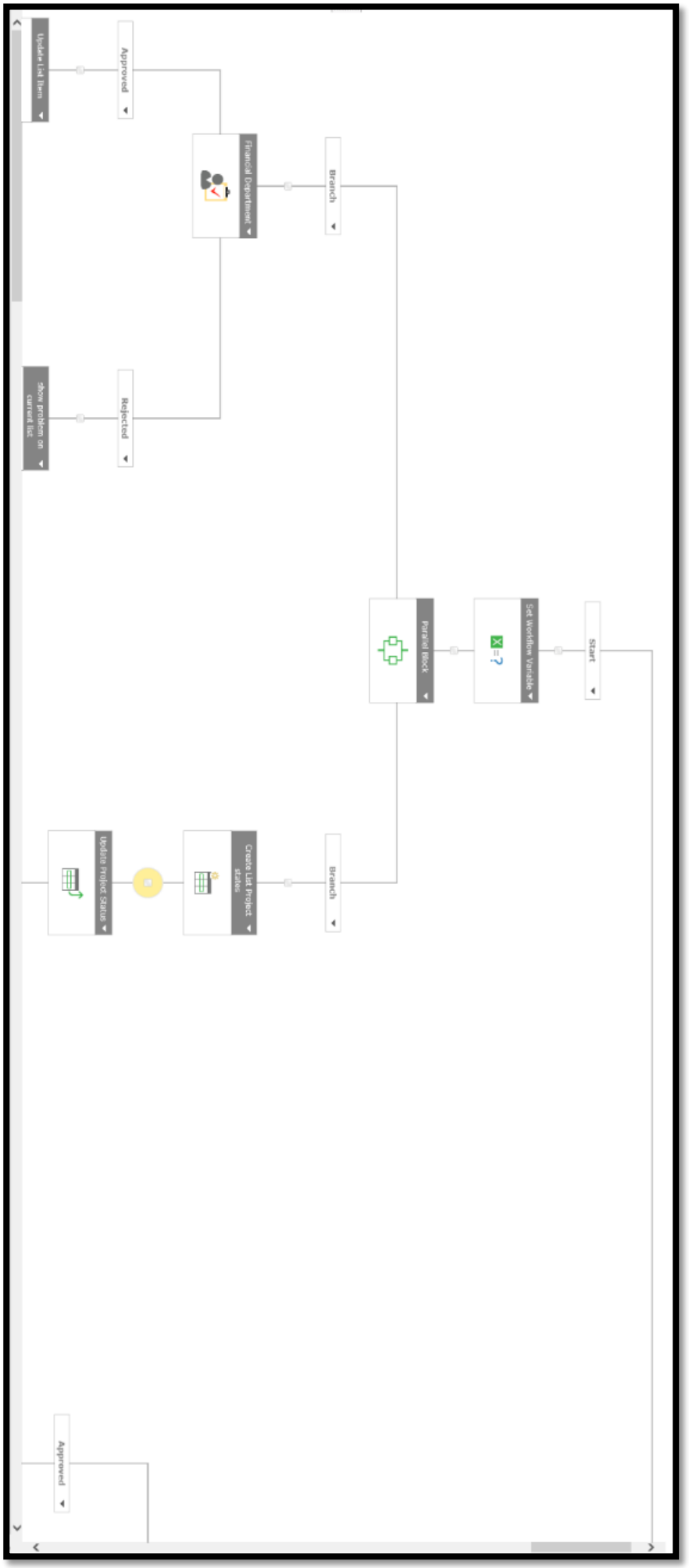
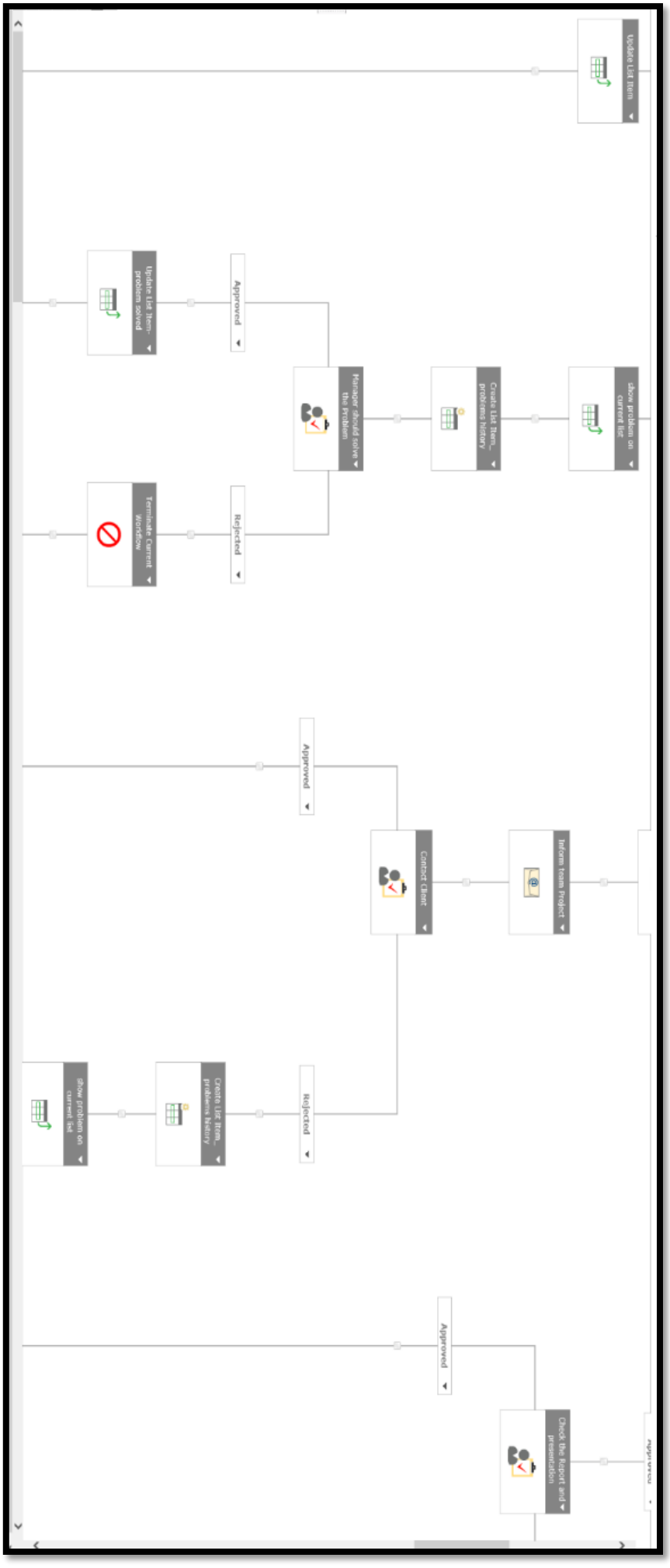
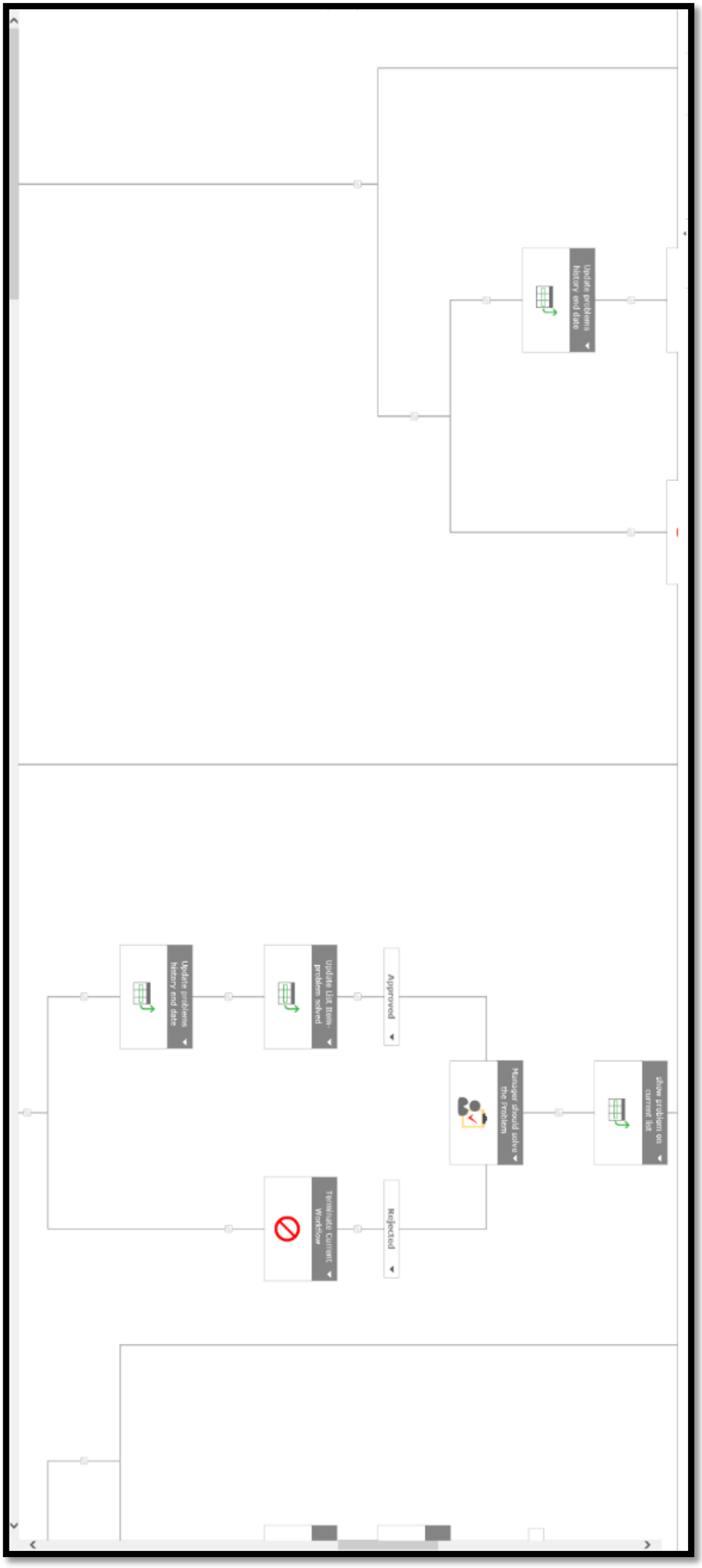
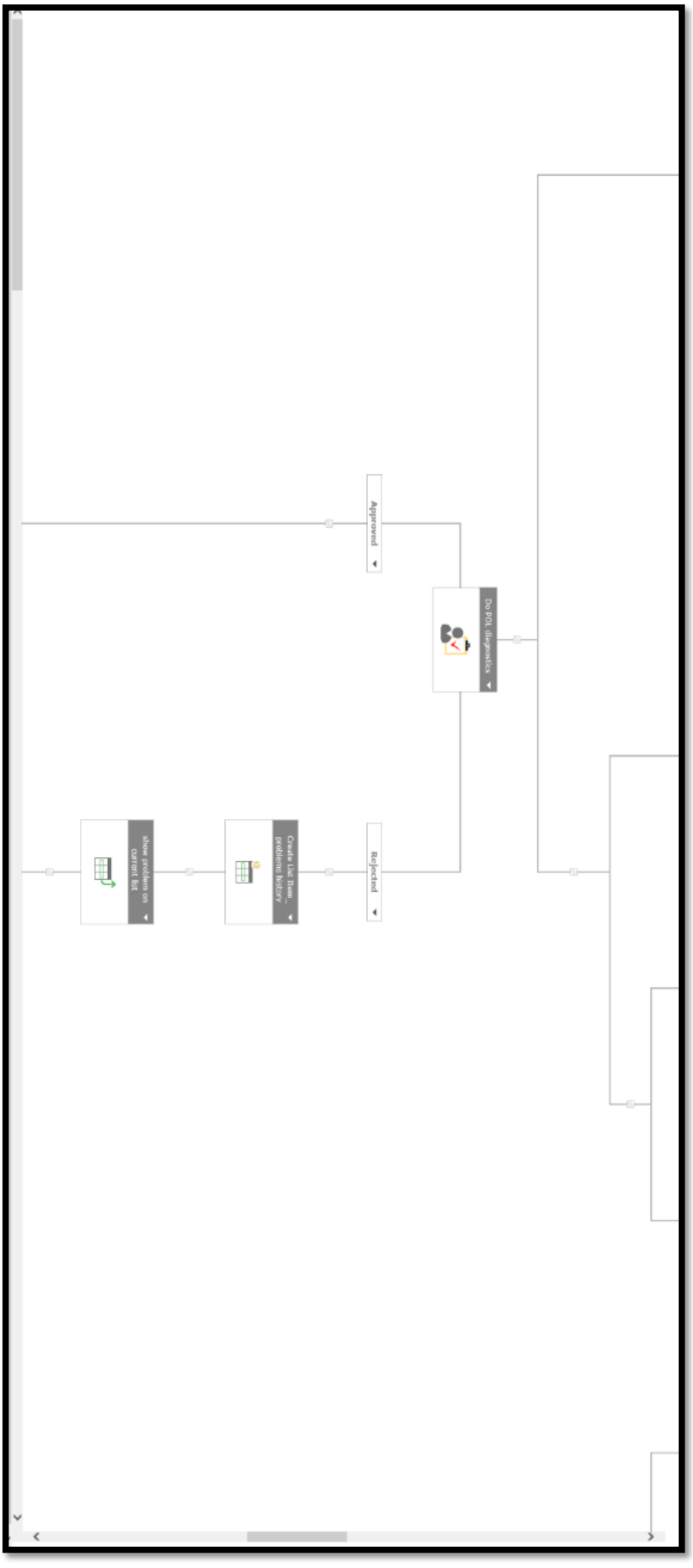


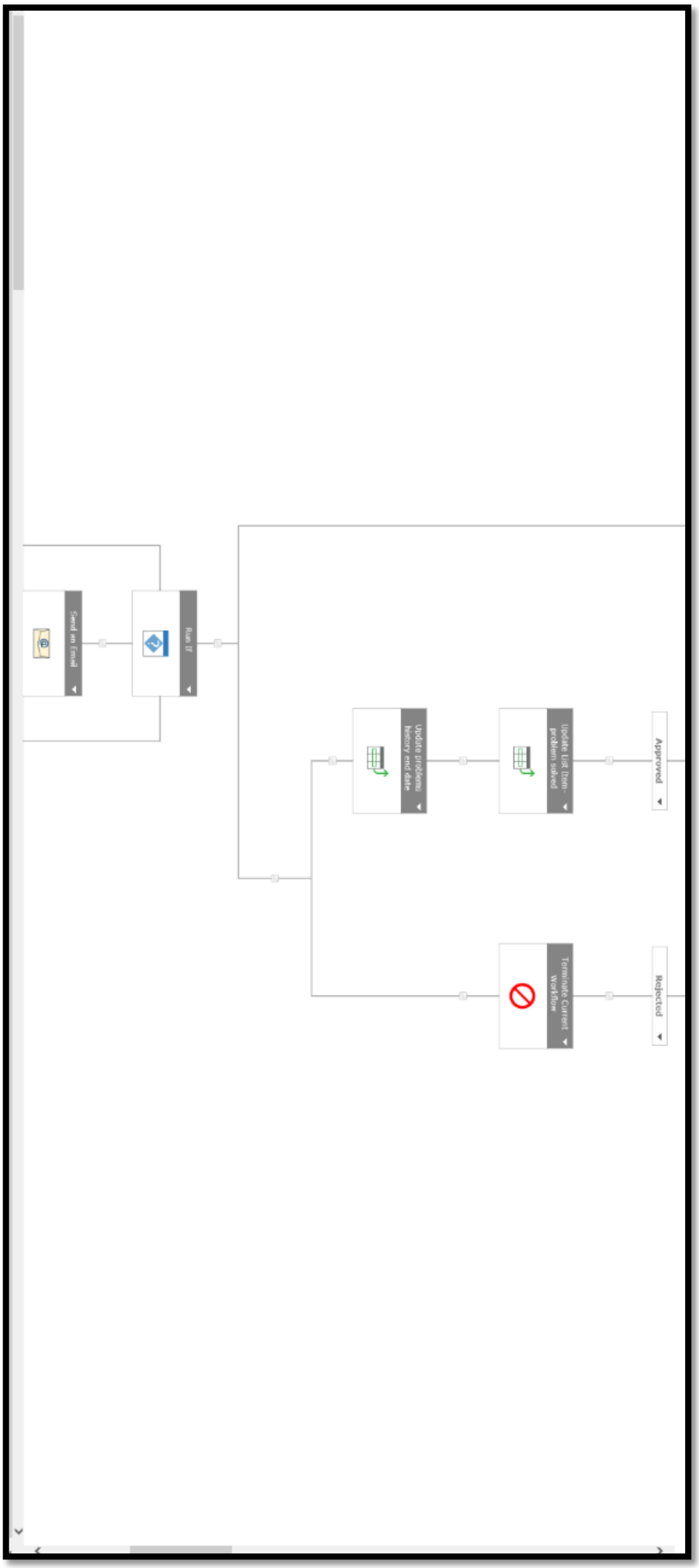
Figure 44- POL Workflow Map (Appendix)

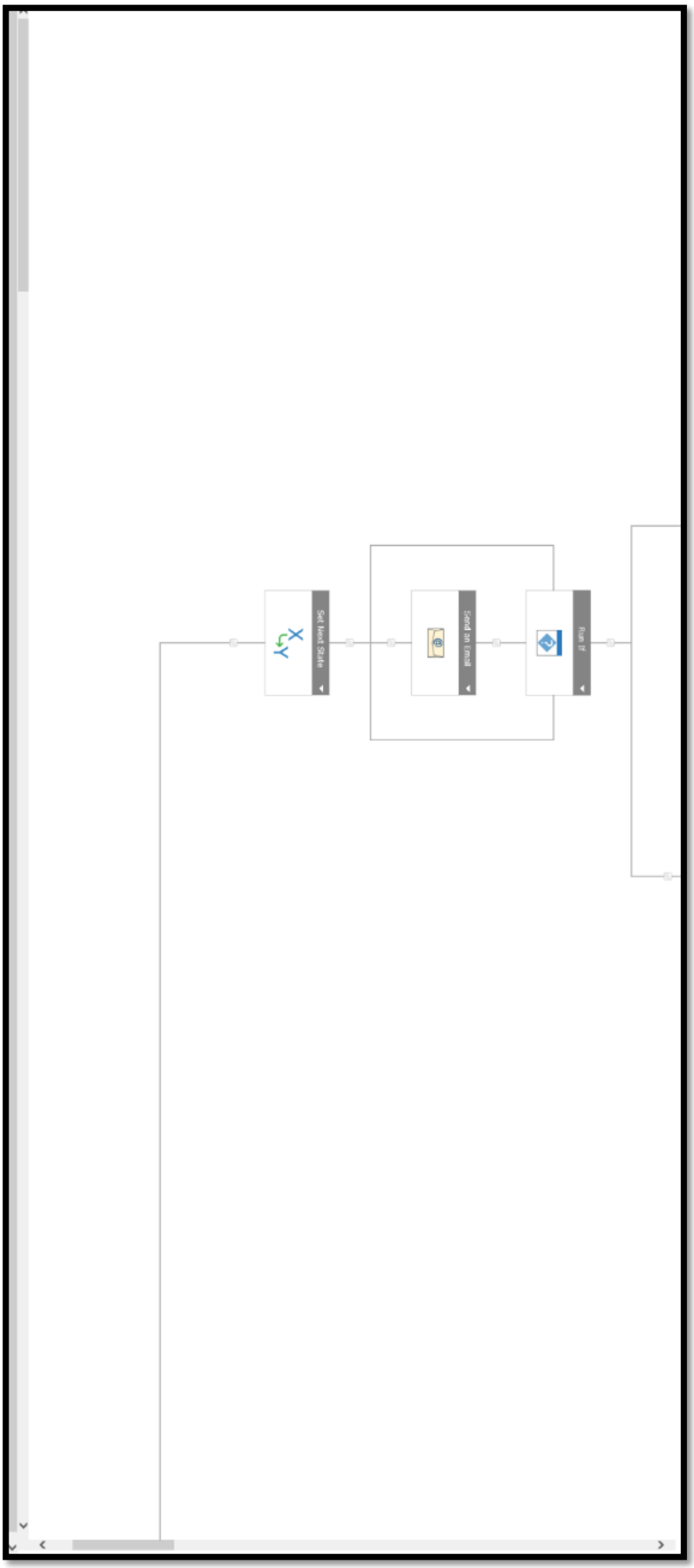

Start
Set WorkFlow Variable
Parallel Block
Branch
Financial Department
Approved
Update List Item
Branch
Create List Project states
Update Project Status
Rejected
show problem on current list
Approved

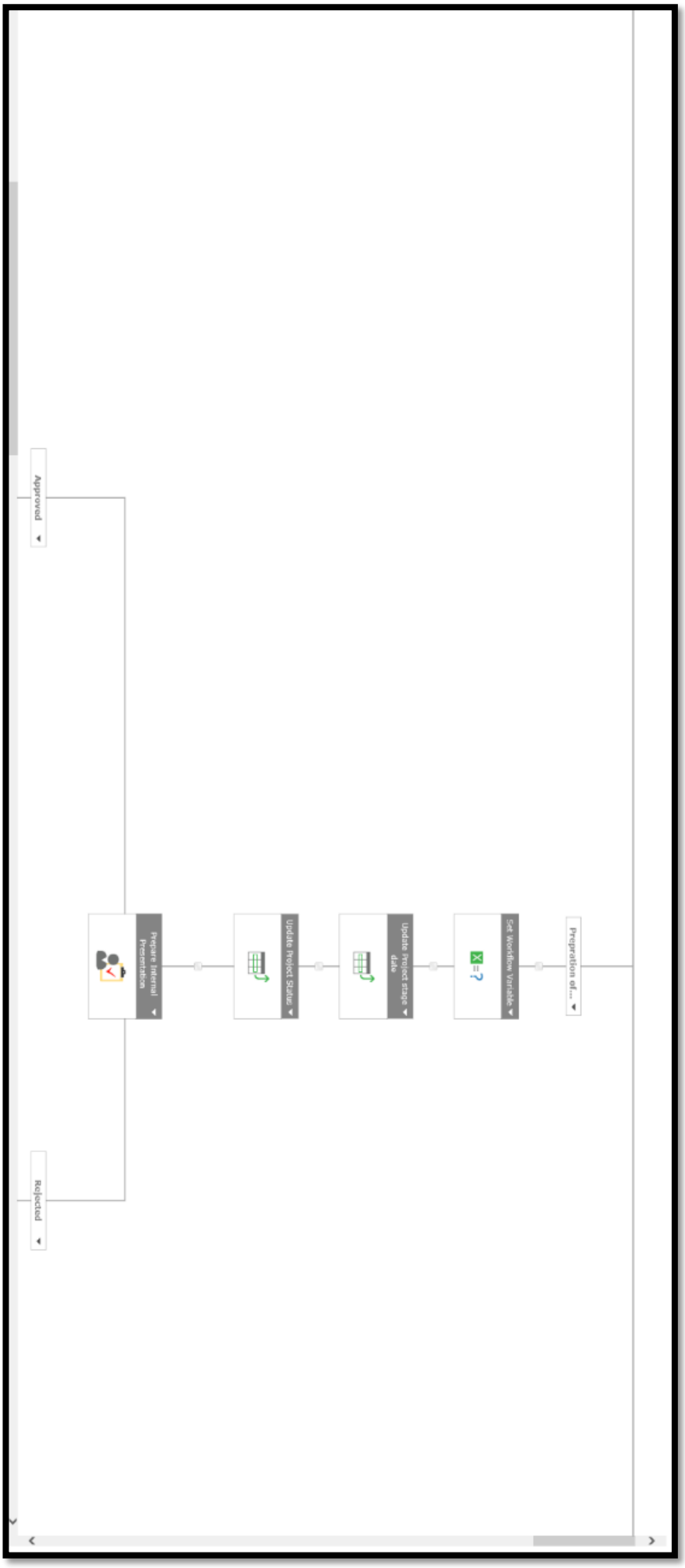

Update List Item
Update List Item- problem solved
Approved
Manager should solve the Problem
Create List Item- problems history
show problem on current list
Terminate Current Workflow
Rejected
Approved
Contact Client
Inform team Project
show problem on current list
Create List Item- problems history
Rejected
Approved
Check the Report and presentation

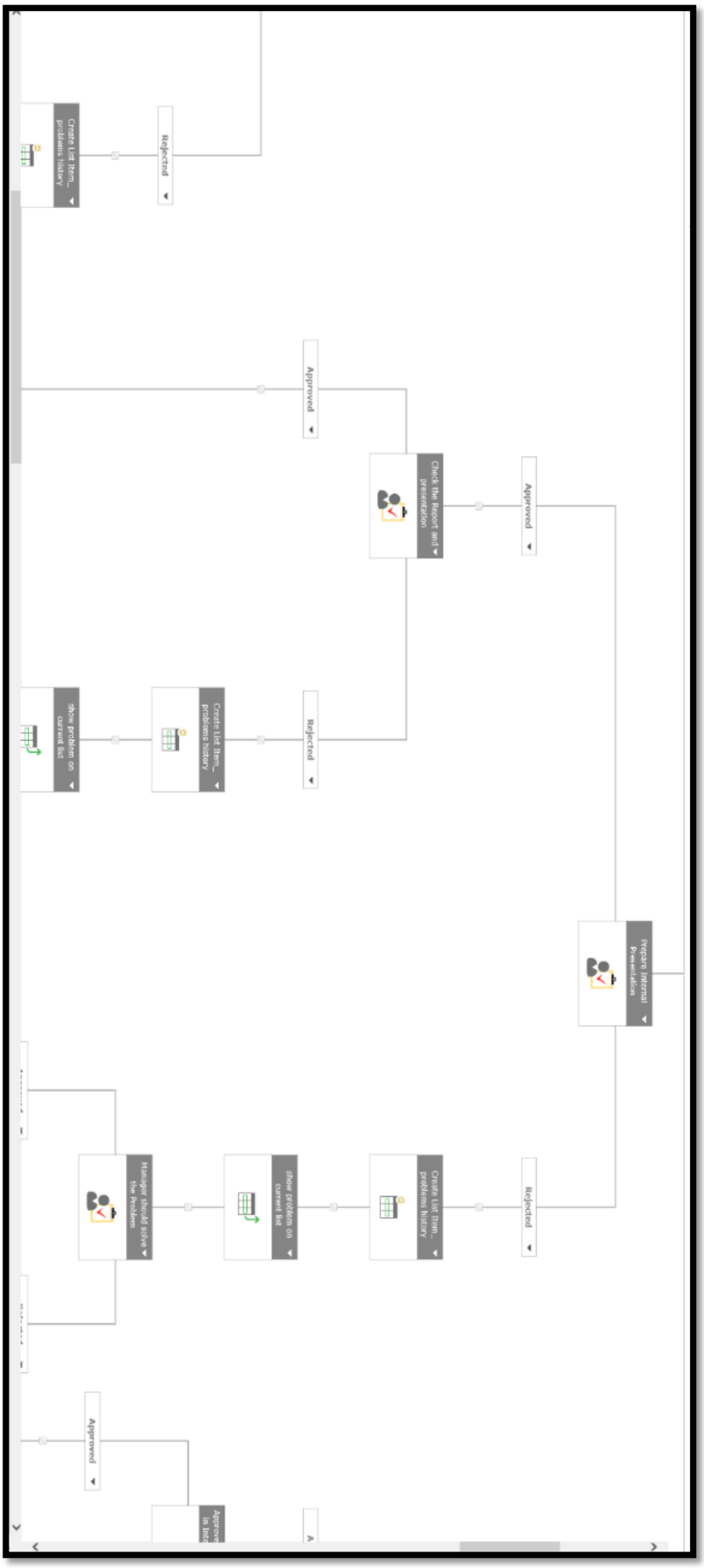

Update problems history end date
Update problems history end date
Update List item- problem solved
Approved
Manager should solve the problem
show problem on current list
Terminate Current Workflow
Rejected

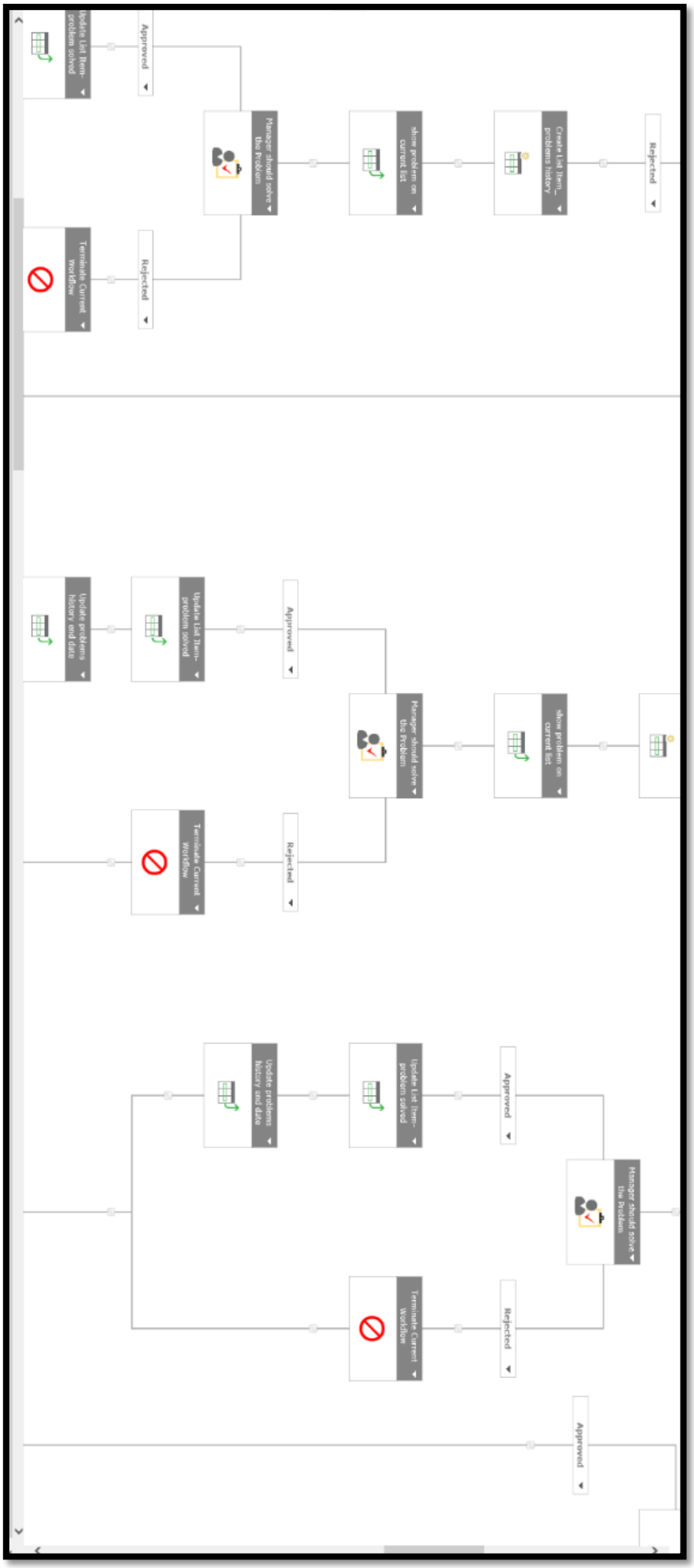

Approved
Do PQL diagnostics
Rejected
Create List Item - problems history
show problems on current list

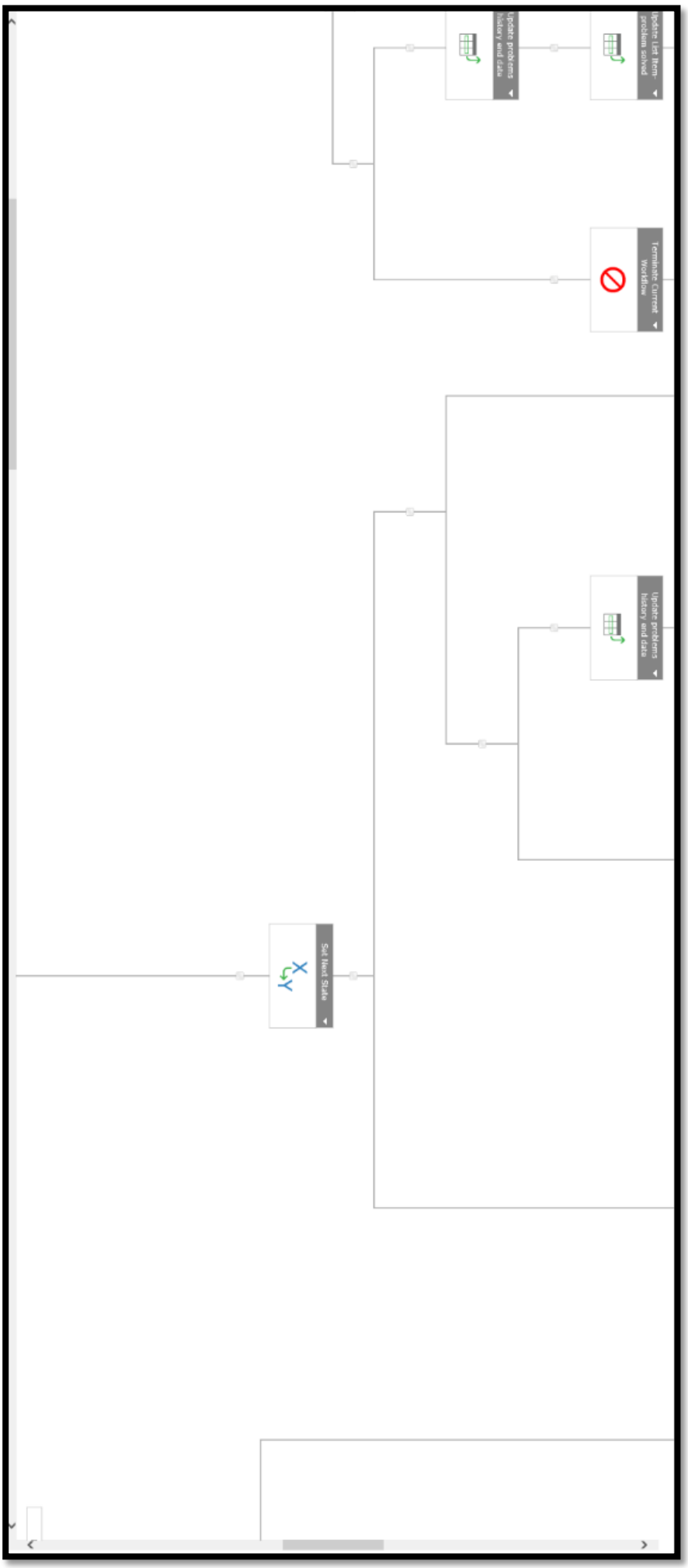

Send an Email
Run If
Update problems history end date
Update List Item - problem solved
Approved
Terminate Current Workflow
Rejected

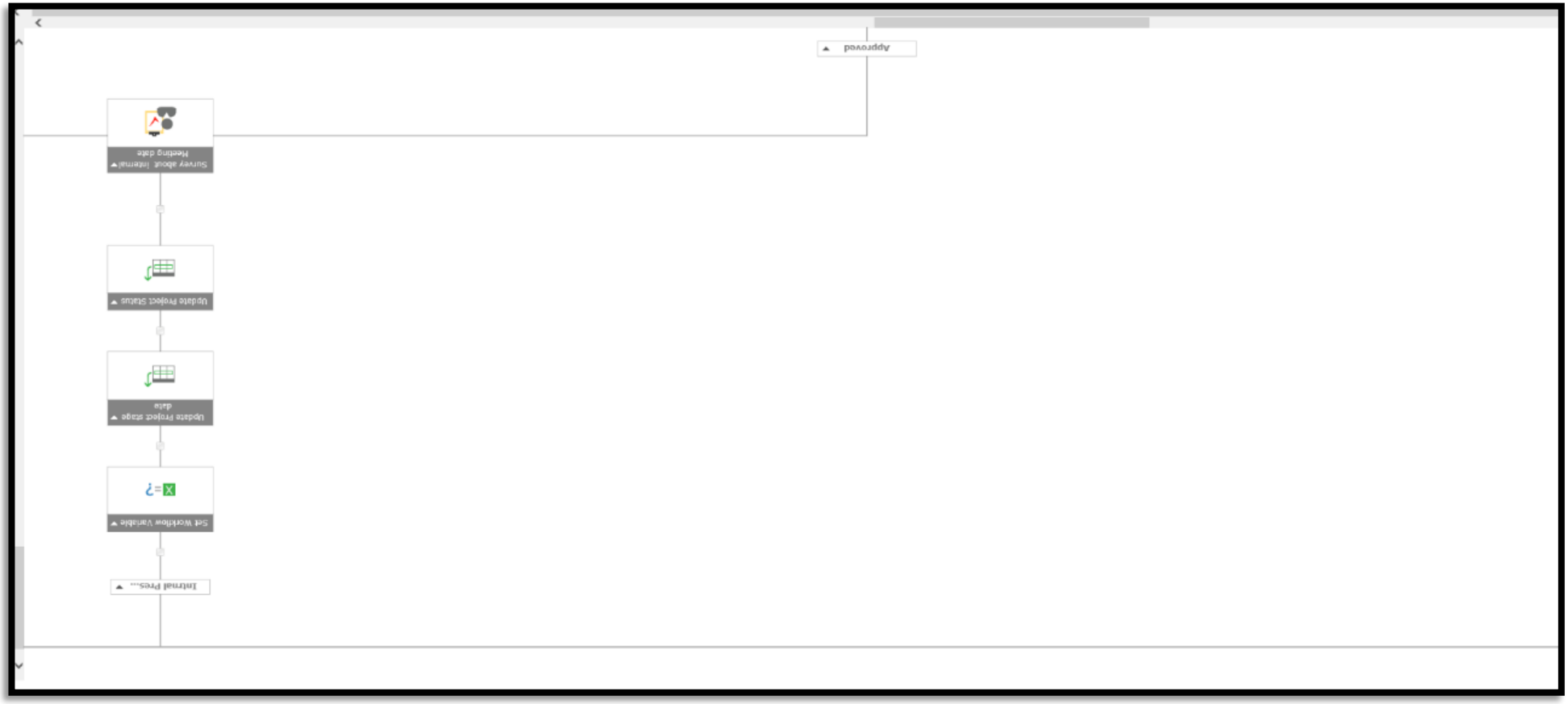

Set Next State
Send an Email
Run If

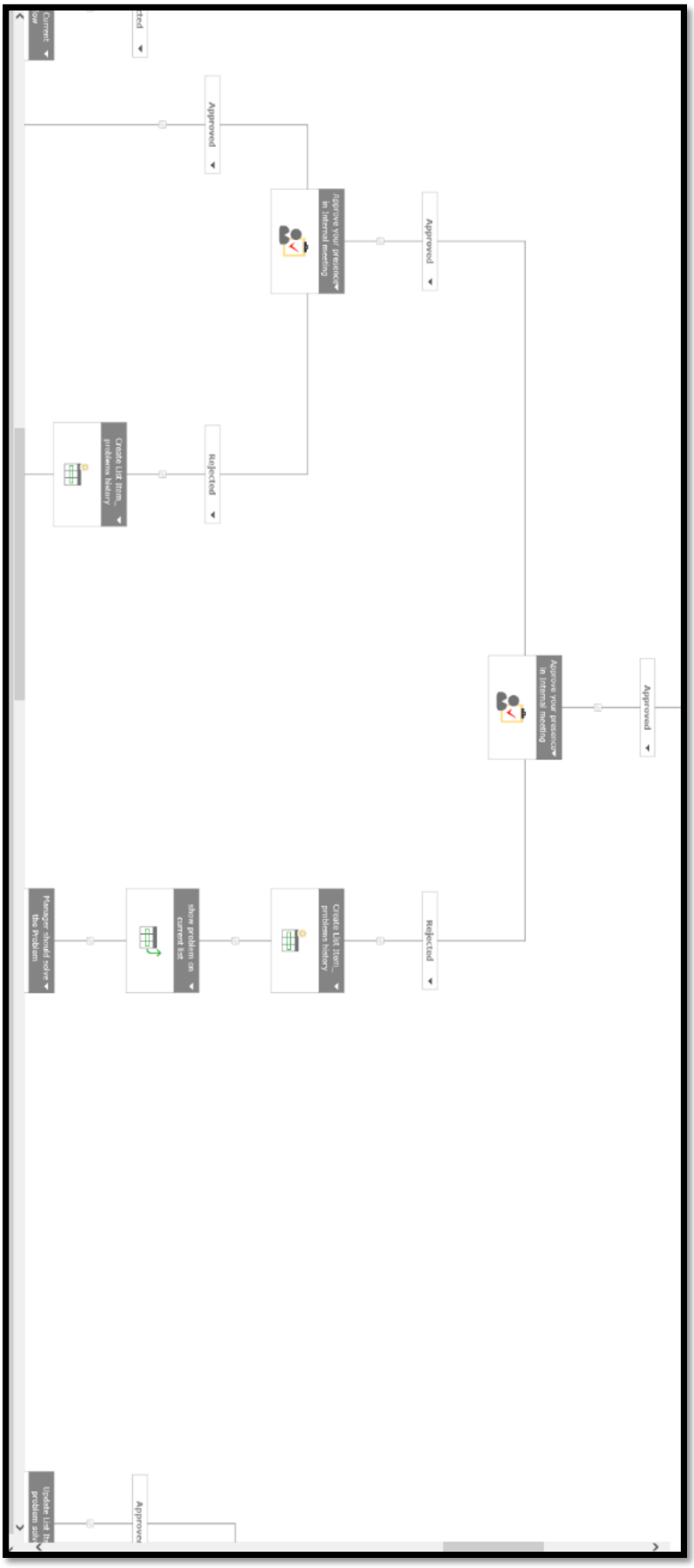

Approved
Rejected
Prepare Internal Presentation
Update Project Status
Update Project stage date
Set Workflow Variable
Preparation of...

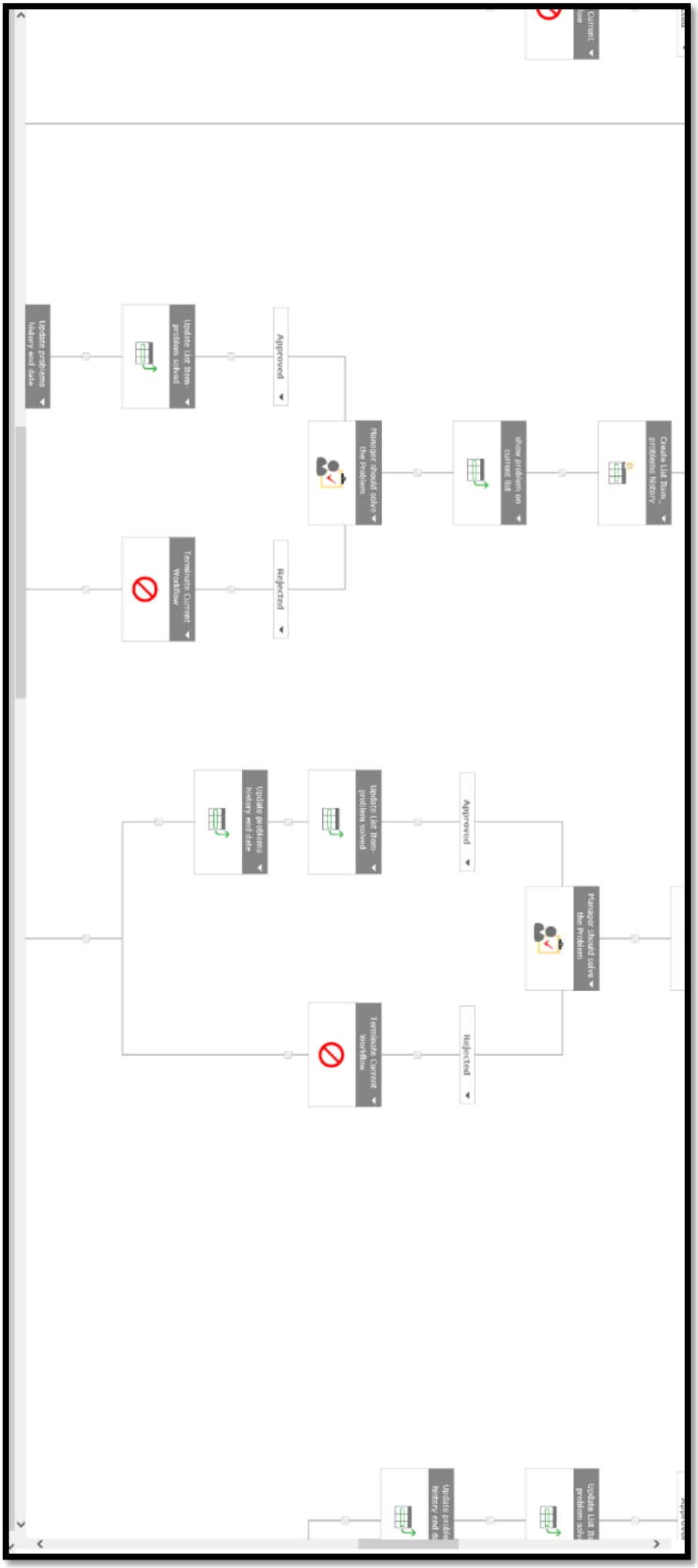

Create List Item_ problems history
Rejected
Approved
Check the Report and presentation
Approved
show problem on current list
Create List Item_ problems history
Rejected
Prepare Internal Presentation
Manager should solve the Problem
show problem on current list
Create List Item_ problems history
Rejected
Approved

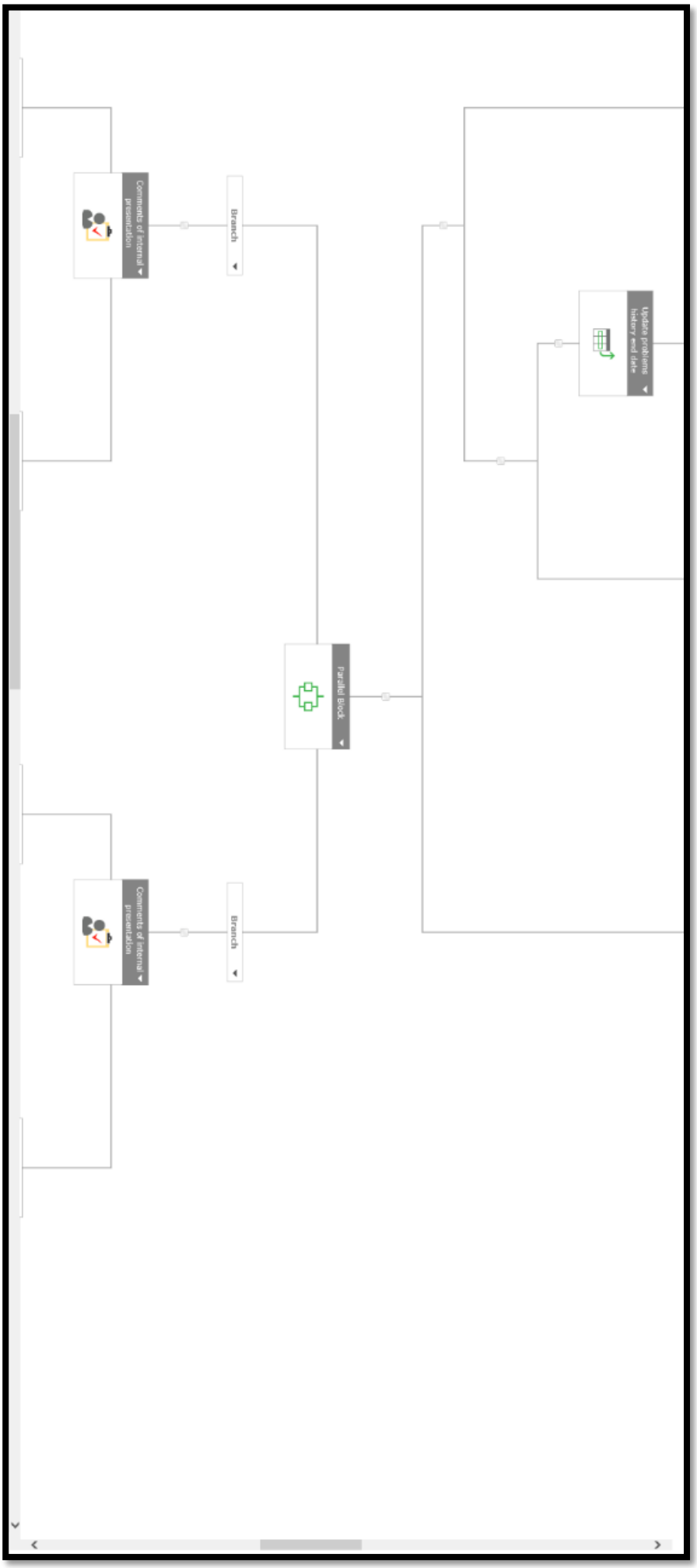

Approved
Update List Item-problem solved
Rejected
Terminate Current Workflow
Manager should solve the Problem
show problem on current list
Create List Item_ problems history
Rejected
Approved
Update problems history and date
Update List Item-problem solved
Approved
Rejected
Terminate Current Workflow
Manager should solve the Problem
show problem on current list
Approved
Update problems history and date
Update List Item-problem solved
Approved
Rejected
Terminate Current Workflow
Manager should solve the Problem
Approved


Update problems history and data
Update List Item - problem solved
Terminate Current Workflow
Update problems history and data
Set Next State

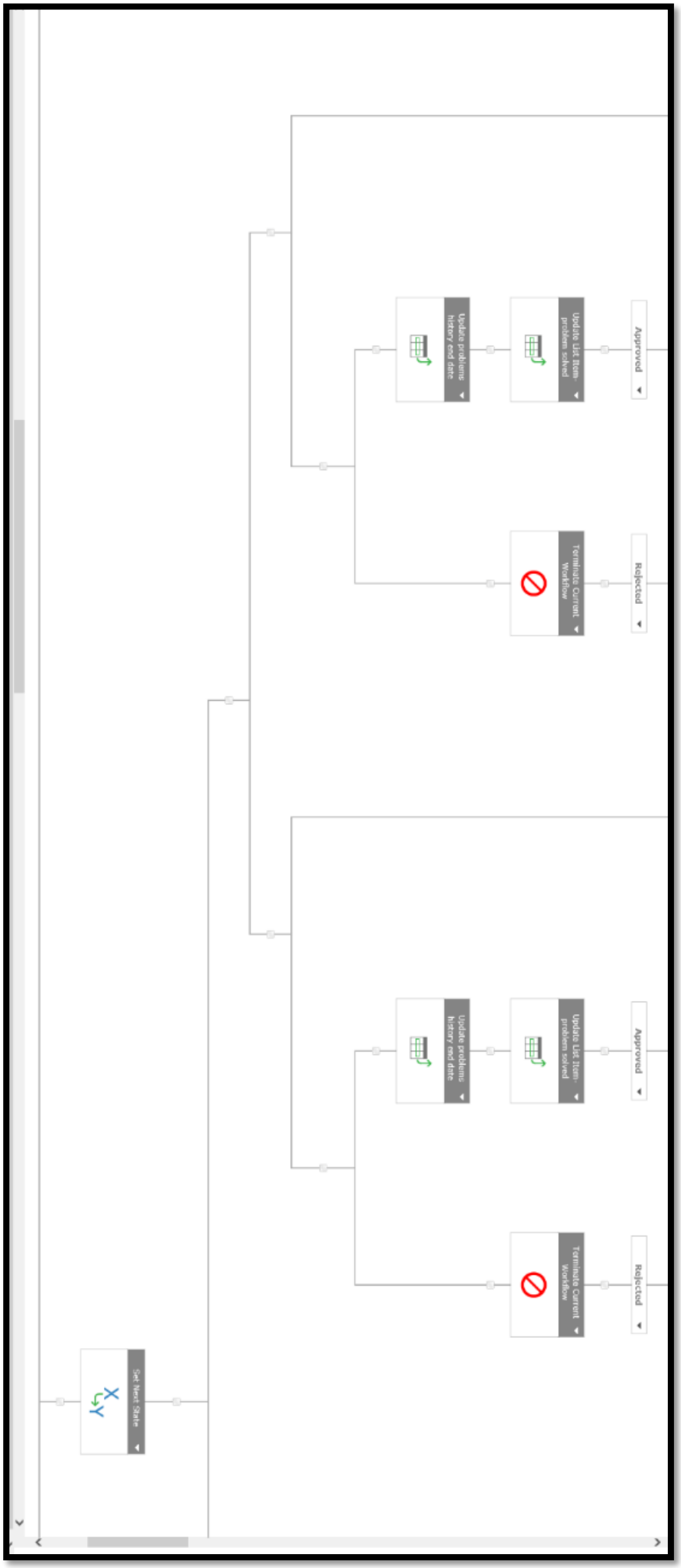

Approved
Survey about Internal Meeting date
Update Project Status
Update Project stage date
Set Workflow Variable
Internal Pres...


Approved
Approve your presence in internal meeting
Approved
Create List Item, problems history
Rejected
Approve your presence in internal meeting
Approved
Manager should solve the problem
show problem on current list
Create List Item, problems history
Rejected

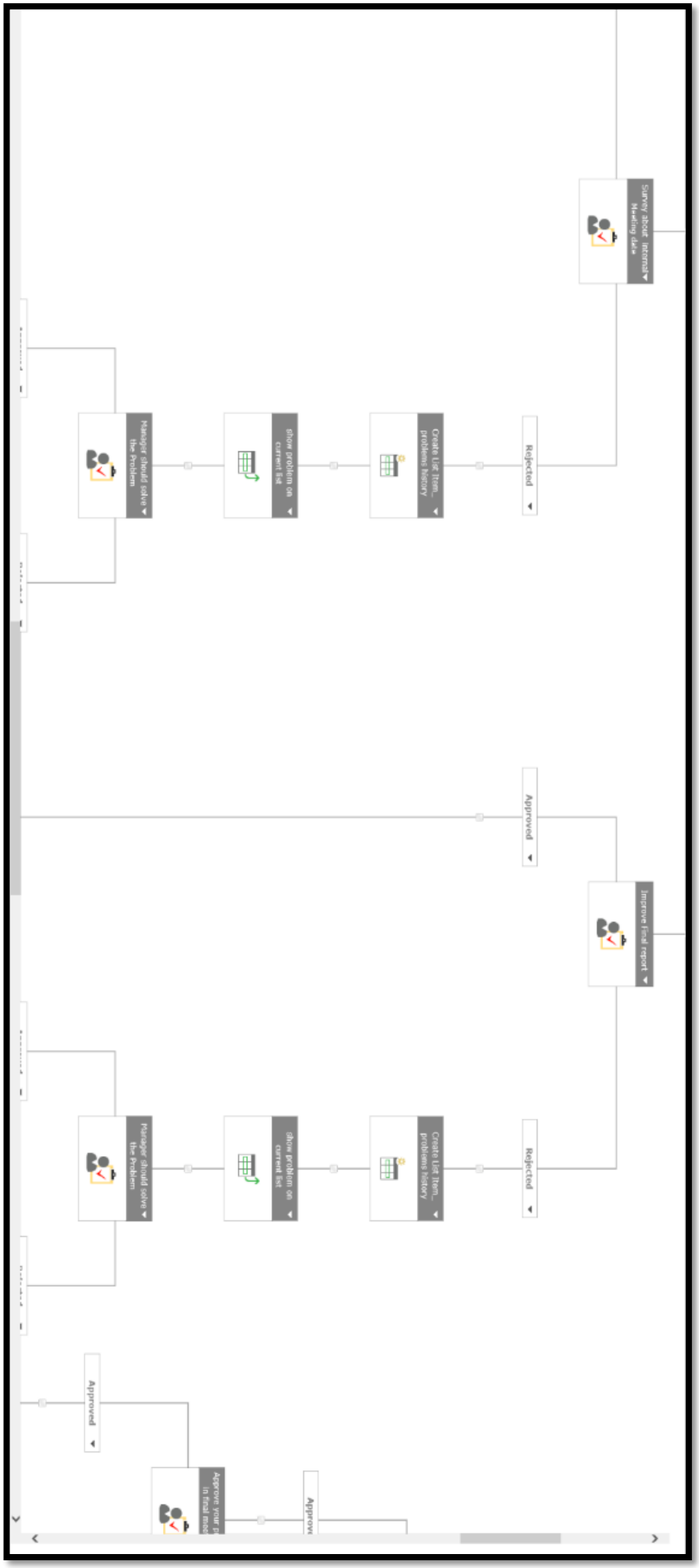

Create List Item_ problems history
show problem on current list
Manager should solve the Problem
Approved
Update List Item- problem solved
Update problems history end date
Rejected
Terminate Current Workflow
Manager should solve the Problem
Approved
Update List Item- problem solved
Update problems history end date
Rejected
Terminate Current Workflow

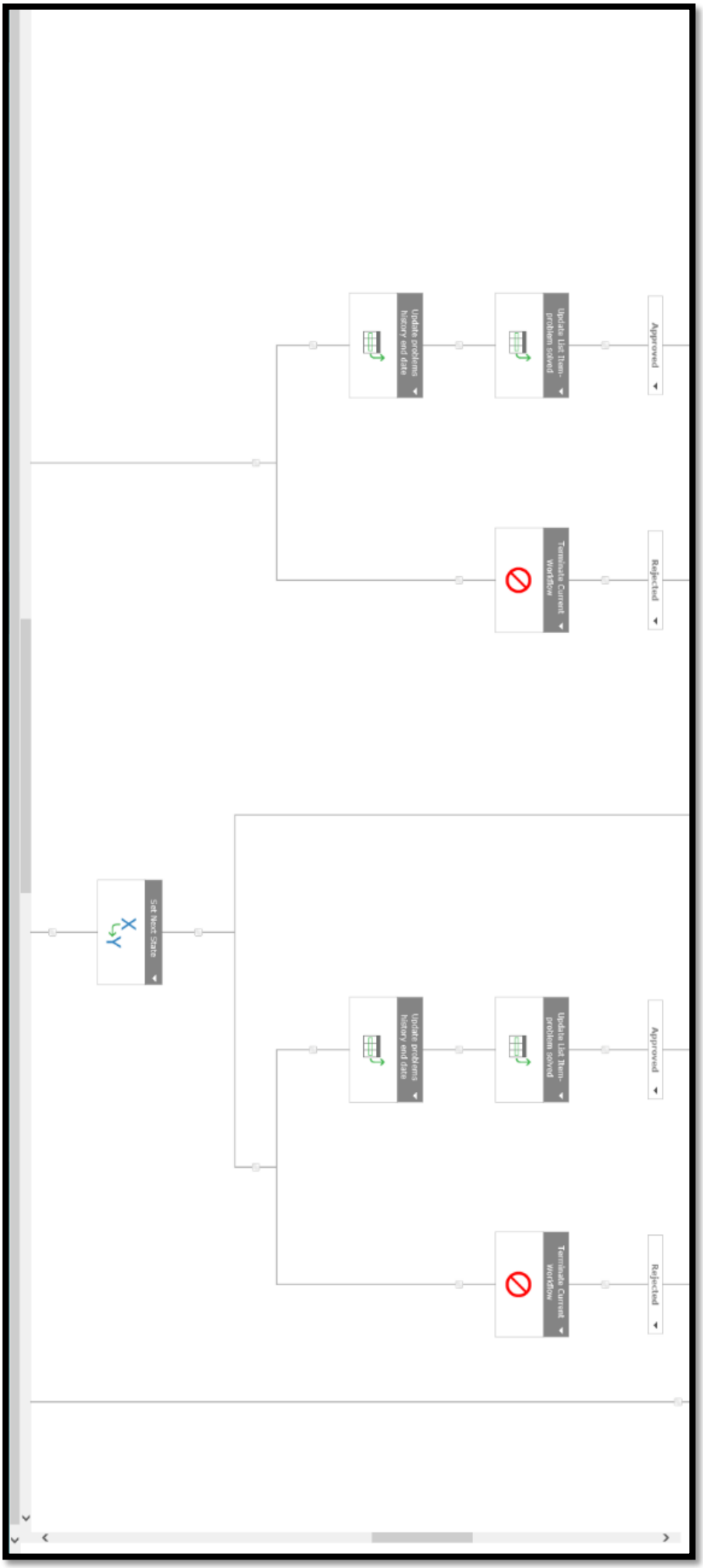

Comments of internal presentation
Branch
Update problems history and date
Parallel Block
Comments of internal presentation
Branch

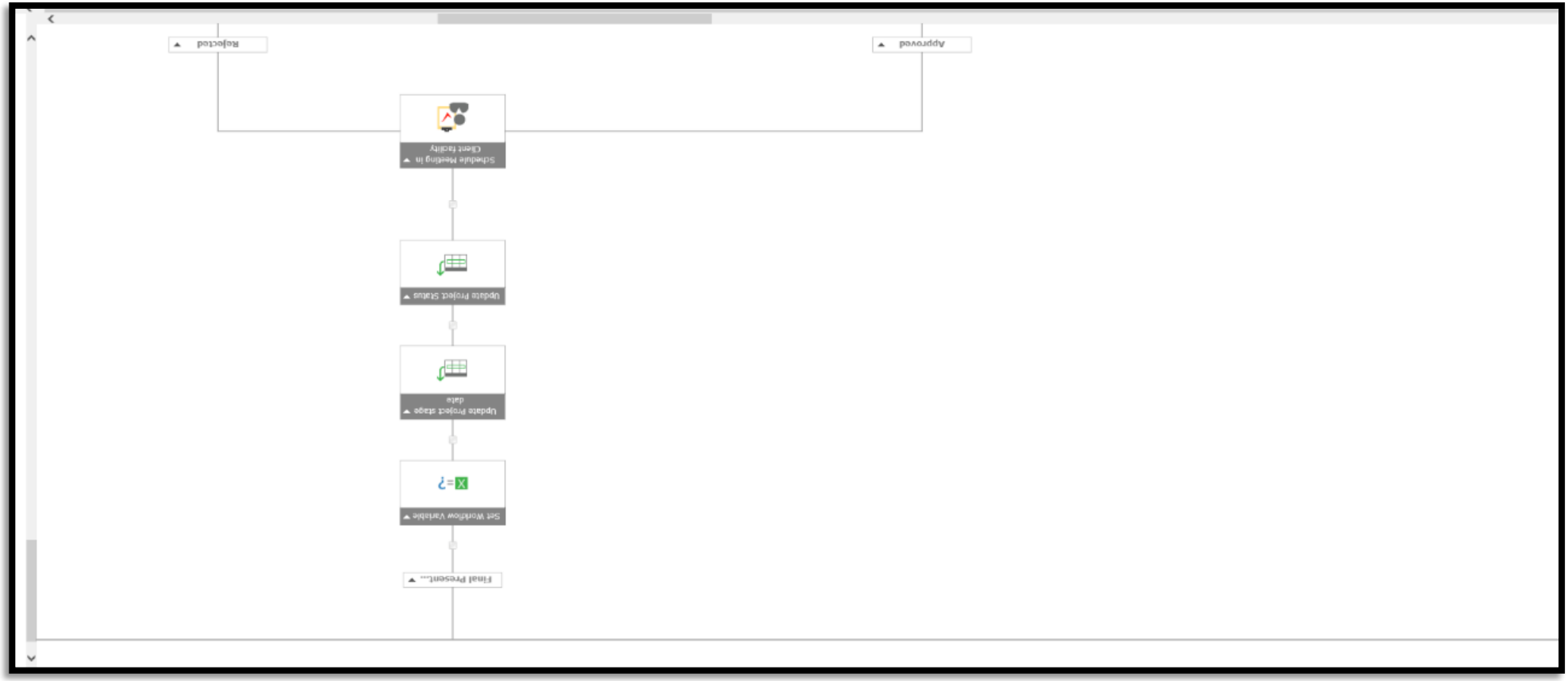

Approved
Comments of internal presentation
Approved
Manager should solve the Problem
Create List Item - problems history
show problem on current list
Rejected
Rejected
Approved
Comments of internal presentation
Approved
Manager should solve the Problem
Create Item in Project Issues
show problem on current list
Rejected
Rejected

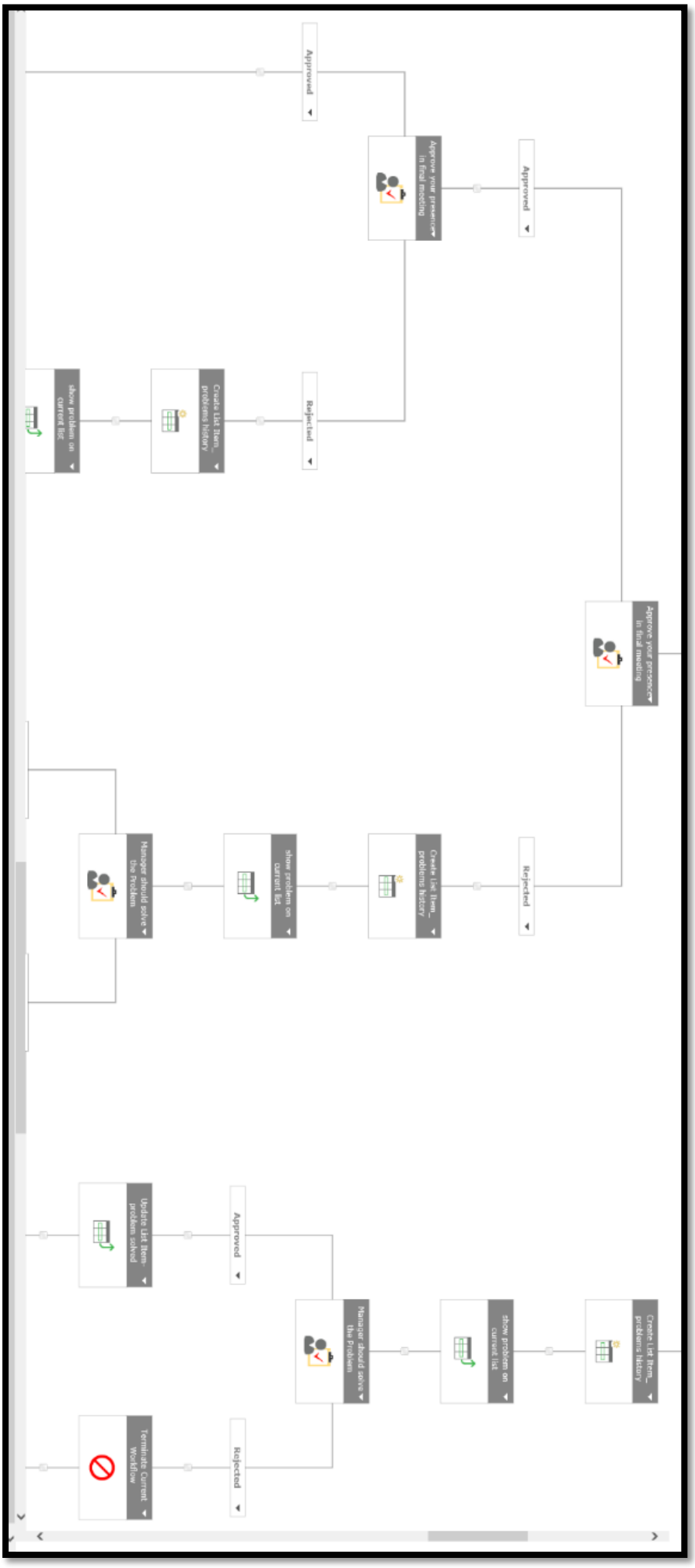

Set Next State
Update problems history end date
Update List Item problem solved
Approved
Terminate Current Workflow
Rejected
Update problems history end date
Update List Item problem solved
Approved
Terminate Current Workflow
Rejected

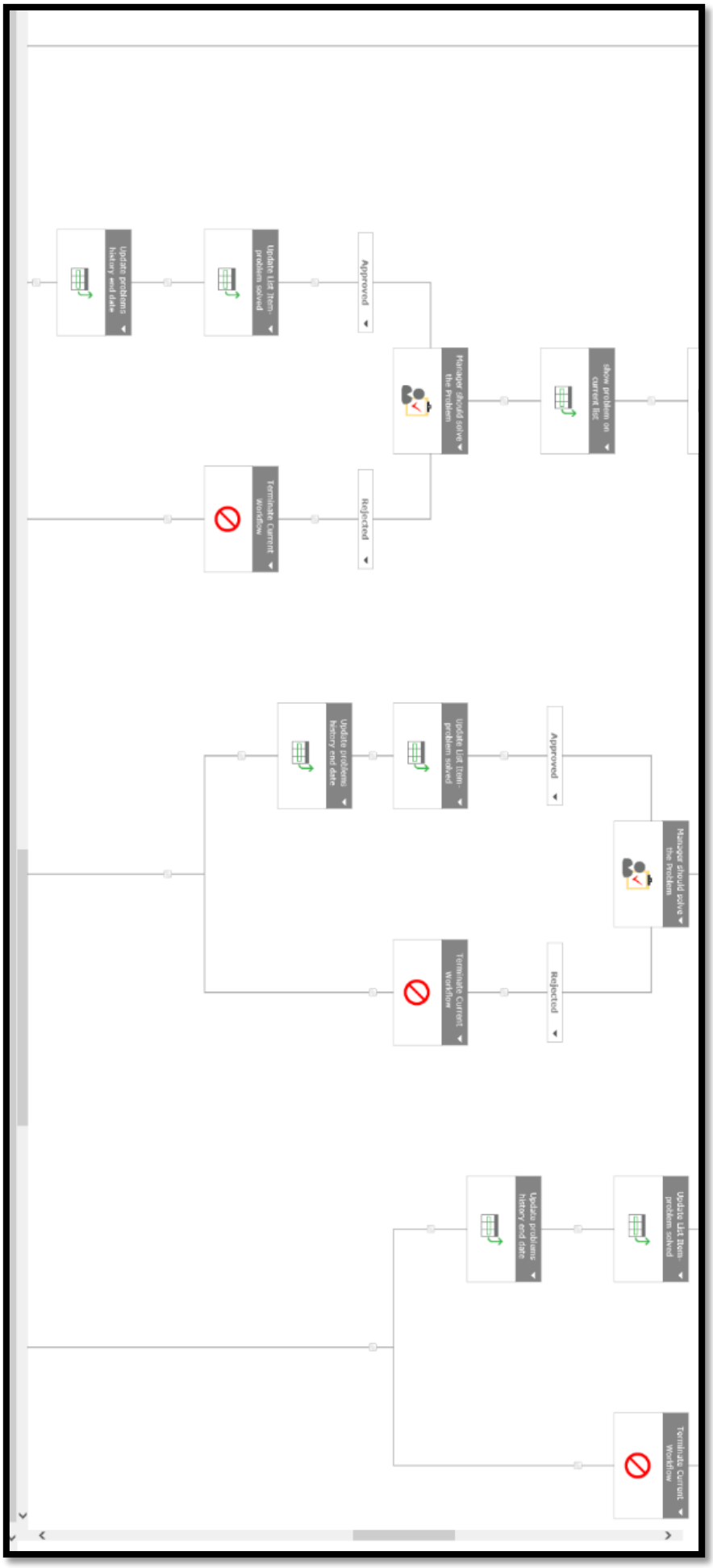

Survey about Internal Meeting date
Update Project Status
Update Project stage date
Set Workflow Variable
Internal Pres...
Scale Middle
Improve Final report
Update Project Status
Update Project stage date
Set Workflow Variable
Final Report

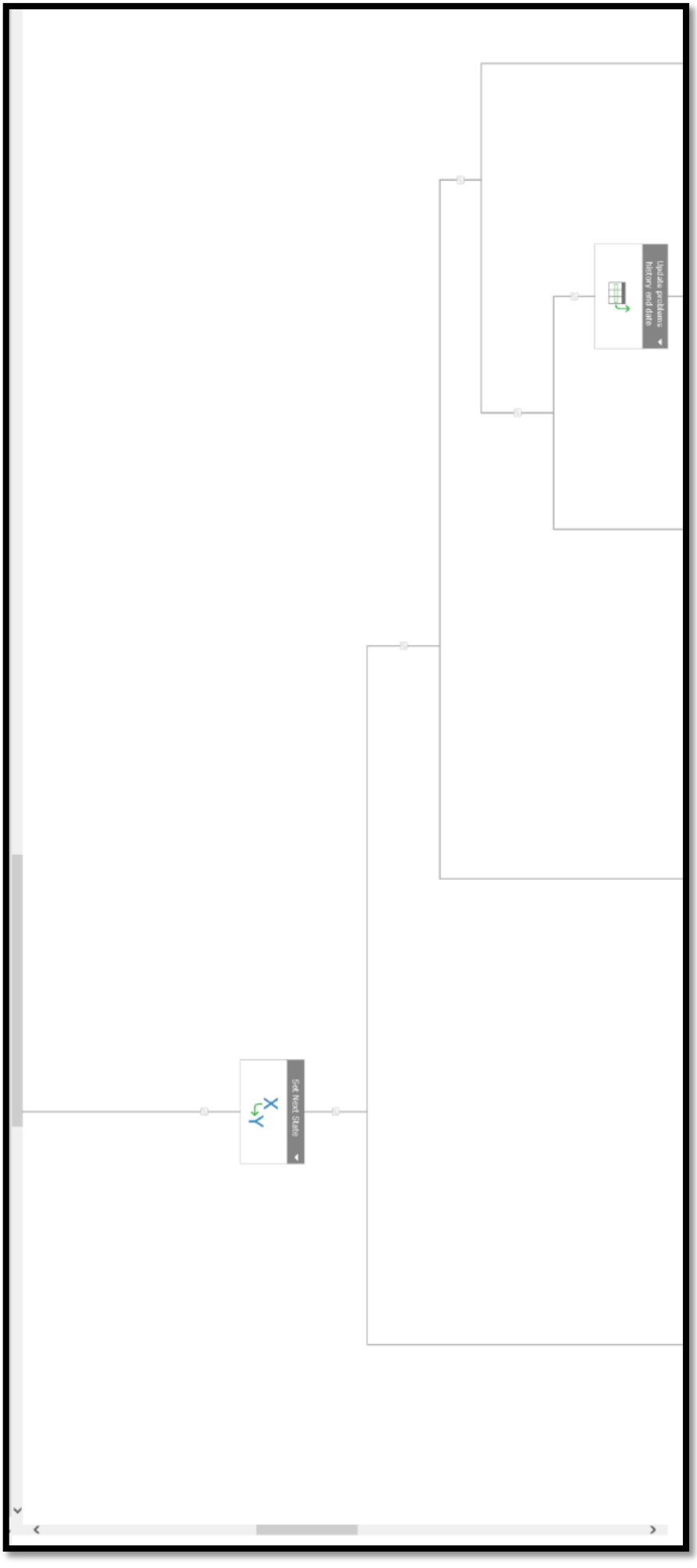

Survey about internal Meeting date
Rejected
Create List Item, problems history
show problem on current list
Manager should solve the Problem
Approved
Improve Final report
Rejected
Create List Item, problems history
show problem on current list
Manager should solve the Problem
Approved

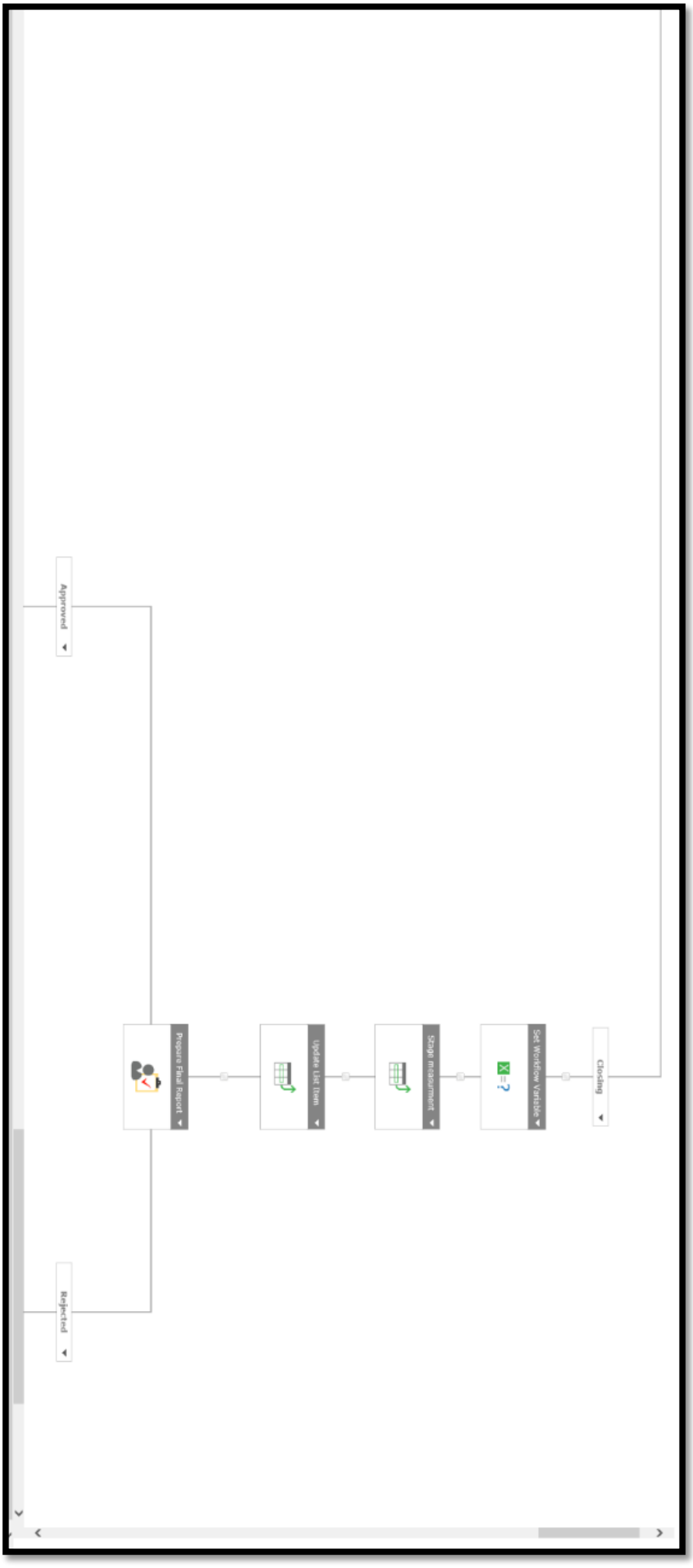

Approved
Update List Item- problem solved
Update problems history end date
Rejected
Terminate Current Workflow
Set Next State
Approved
Update List Item- problem solved
Update problems history end date
Rejected
Terminate Current Workflow

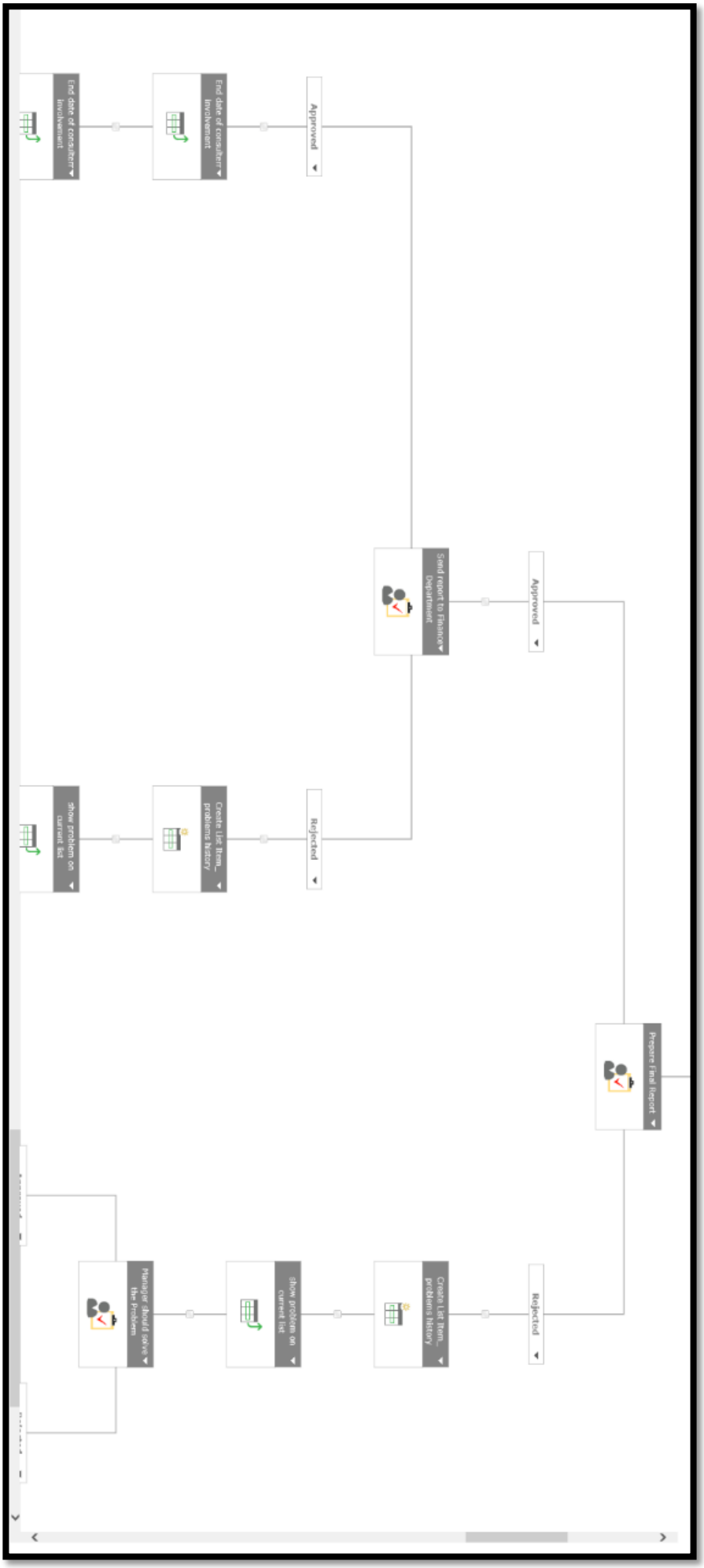

Rejected
Approved
Schedule Meeting in Client facility
Update Project Status
Update Project stage date
Set Workflow Variable
Final Present...

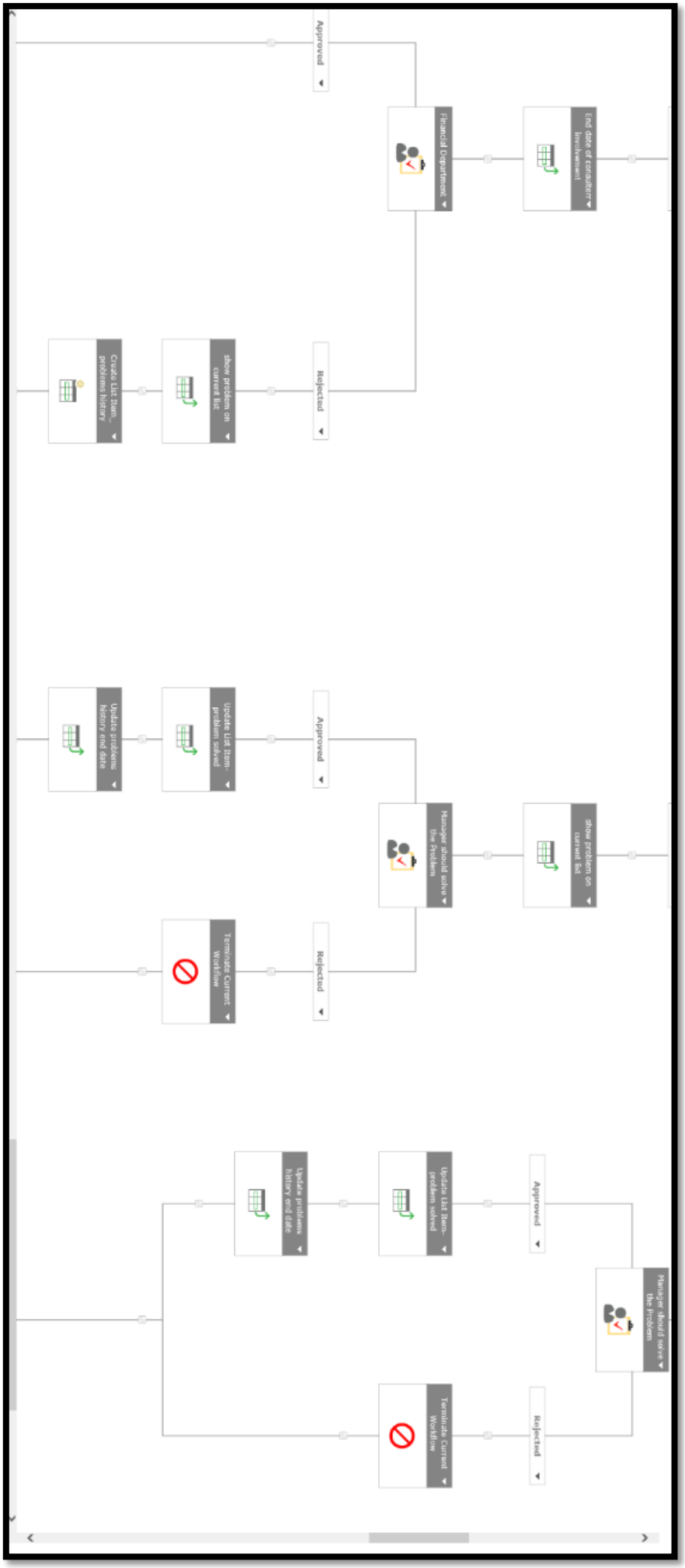

Approved
Approve your presence in final meeting
Approved
show problem on current list
Create List Item_ problems history
Rejected
Approve your presence in final meeting
Manager should solve the Problem
show problem on current list
Create List Item_ problems history
Rejected
Update List Item- problem solved
Approved
Manager should solve the Problem
show problem on current list
Create List Item_ problems history
Terminate Current Workflow
Rejected

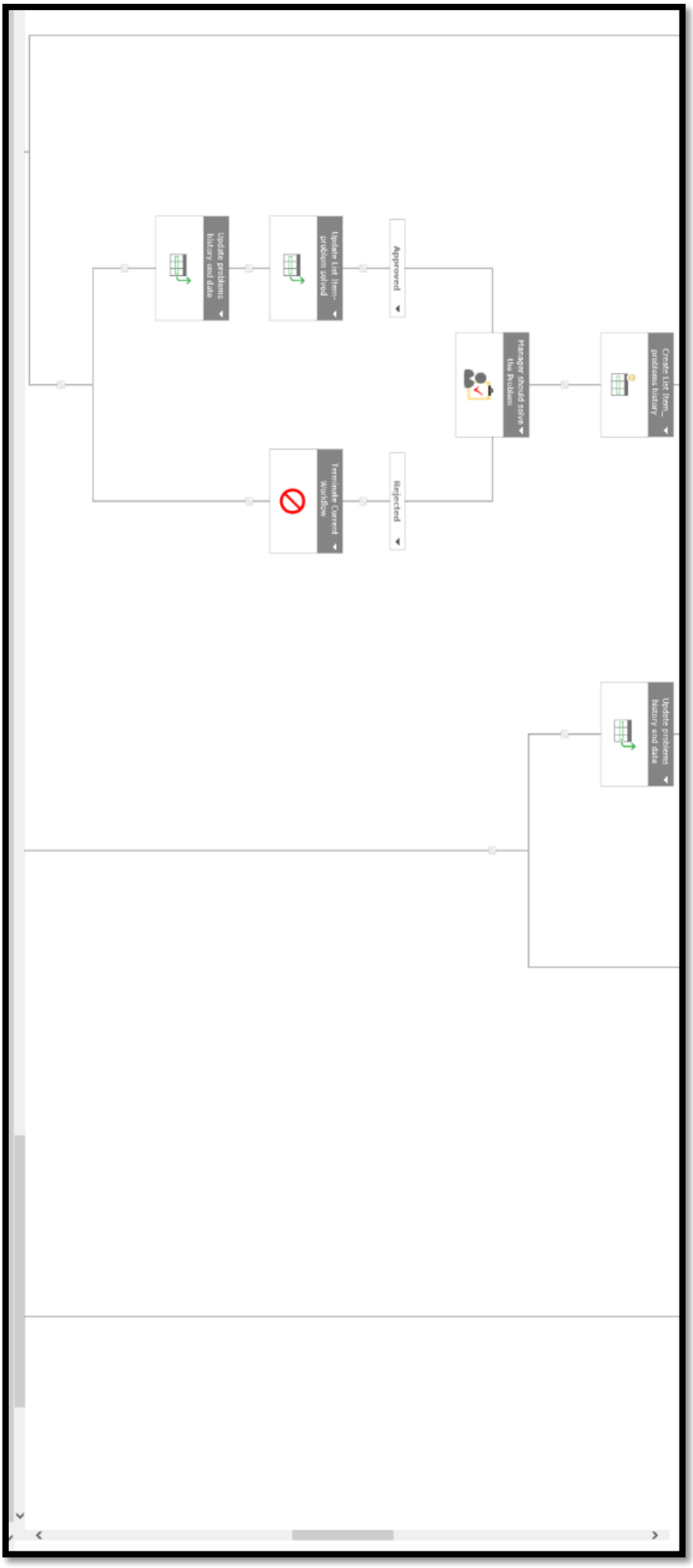

Update problems history end date
Update List Item- problem solved
Approved
Manager should solve the Problem
show problem on current list
Terminate Current Workflow
Rejected
Update problems history end date
Update List Item- problem solved
Approved
Manager should solve the Problem
Terminate Current Workflow
Rejected
Update problems history end date
Update List Item- problem solved
Terminate Current Workflow

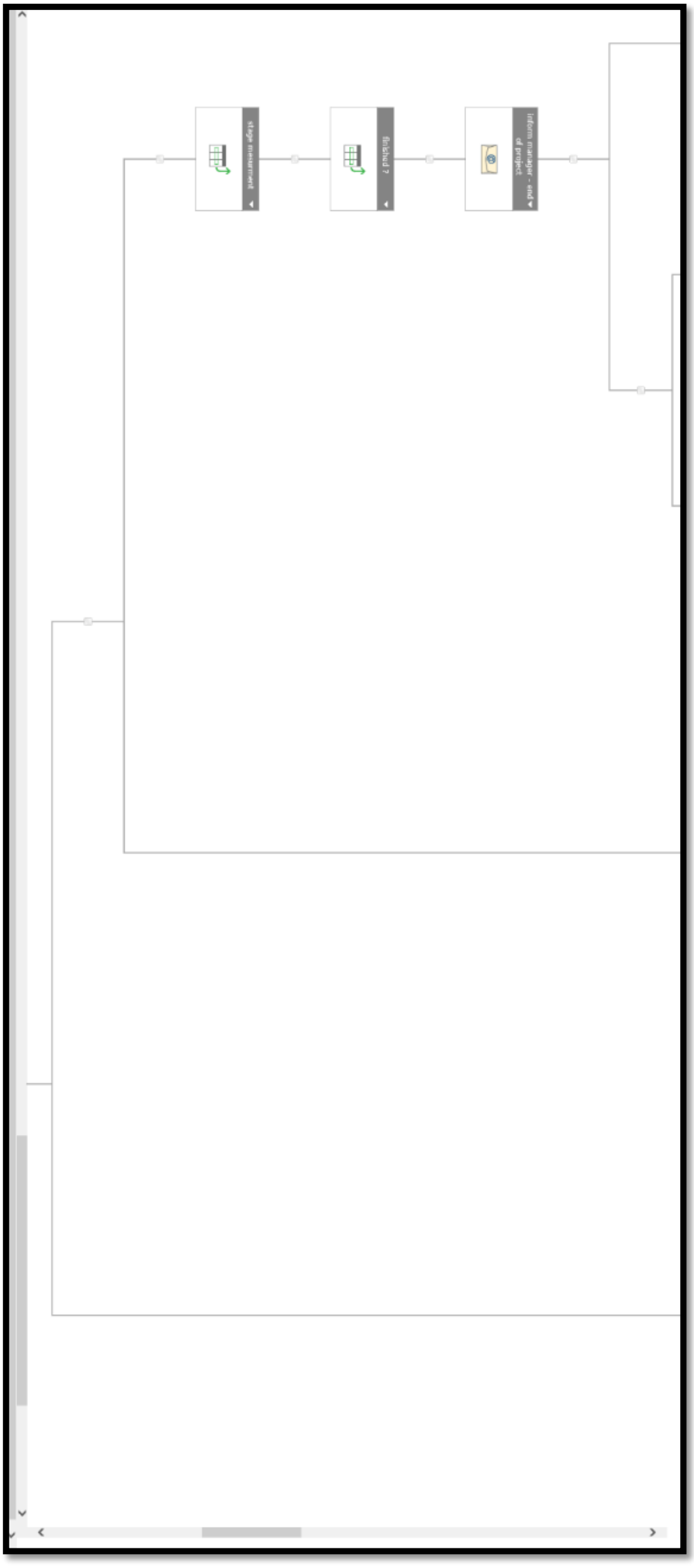

Update problems history end date
Set Next State


Approved
Prepare Final Report
Update List Item
Stage management
Set Workflow Variable
Closing
Rejected


End date of consultant involvement
End date of consultant involvement
Approved
Send report to Finance Department
Approved
Show problem on current list
Create List Item, problems history
Rejected
Prepare Final Report
Manage should solve the Problem
Show problem on current list
Create List Item, problems history
Rejected


Approved
Financial Department
End date of consultant involvement
Rejected
show problem on current list
Create List Item- problems history
Approved
Manager should solve the Problem
show problem on current list
Update List Item- problem solved
Update problems history end date
Rejected
Terminate Current Workflow
Approved
Manager should solve the Problem
Update List Item- problem solved
Update problems history end date
Rejected
Terminate Current Workflow


Update problems history and date
Update List Item- problem solved
Approved
Manager should solve the Problem
Create List Item- problems history
Terminate Current Workflow
Rejected
Update problems history and date


stage measurement
finished ?
inform manager - end of project

Leave request workflow:

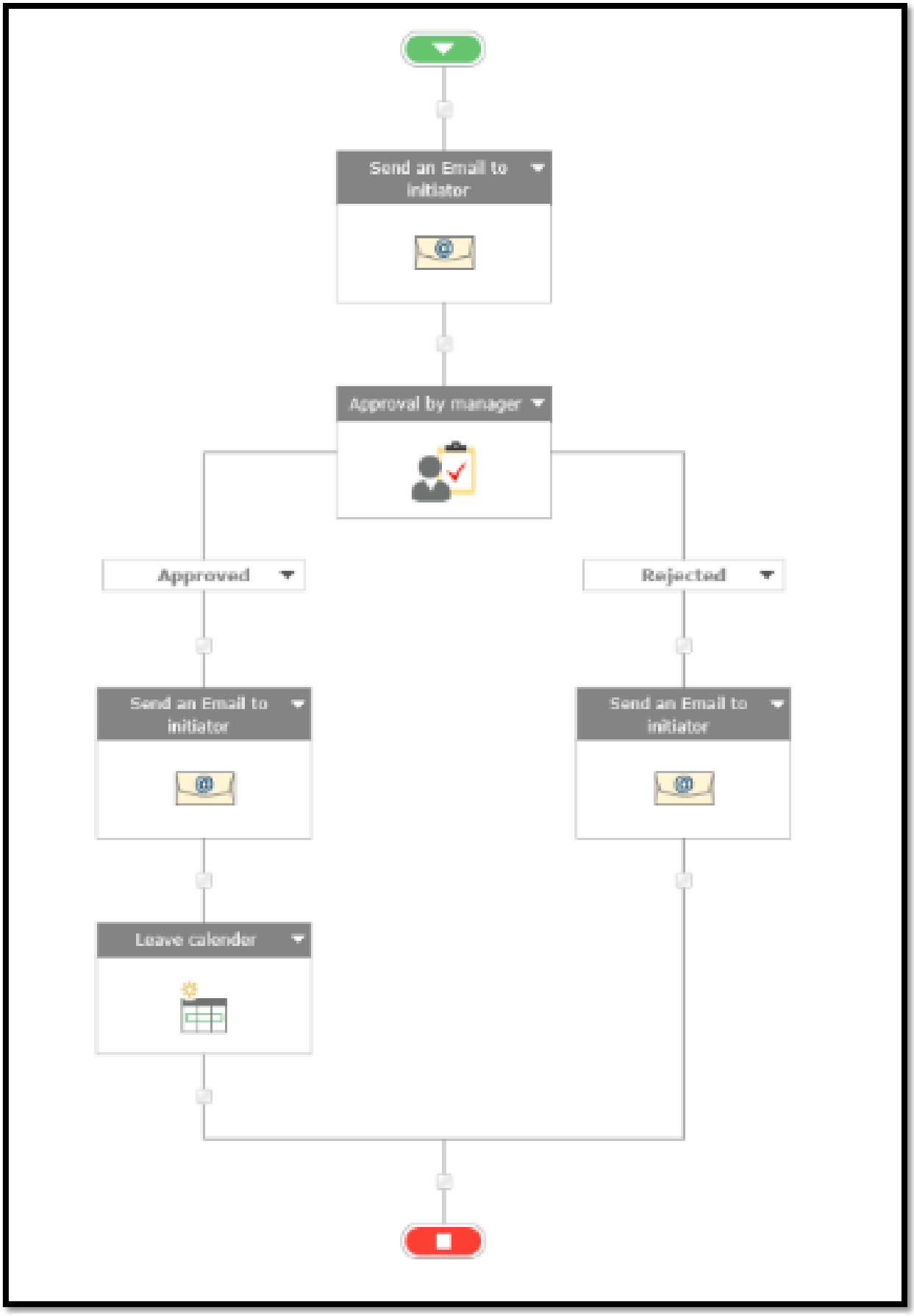


Figure 45- Leave Request workflow (Appendix)

Resource Emergency workflow:

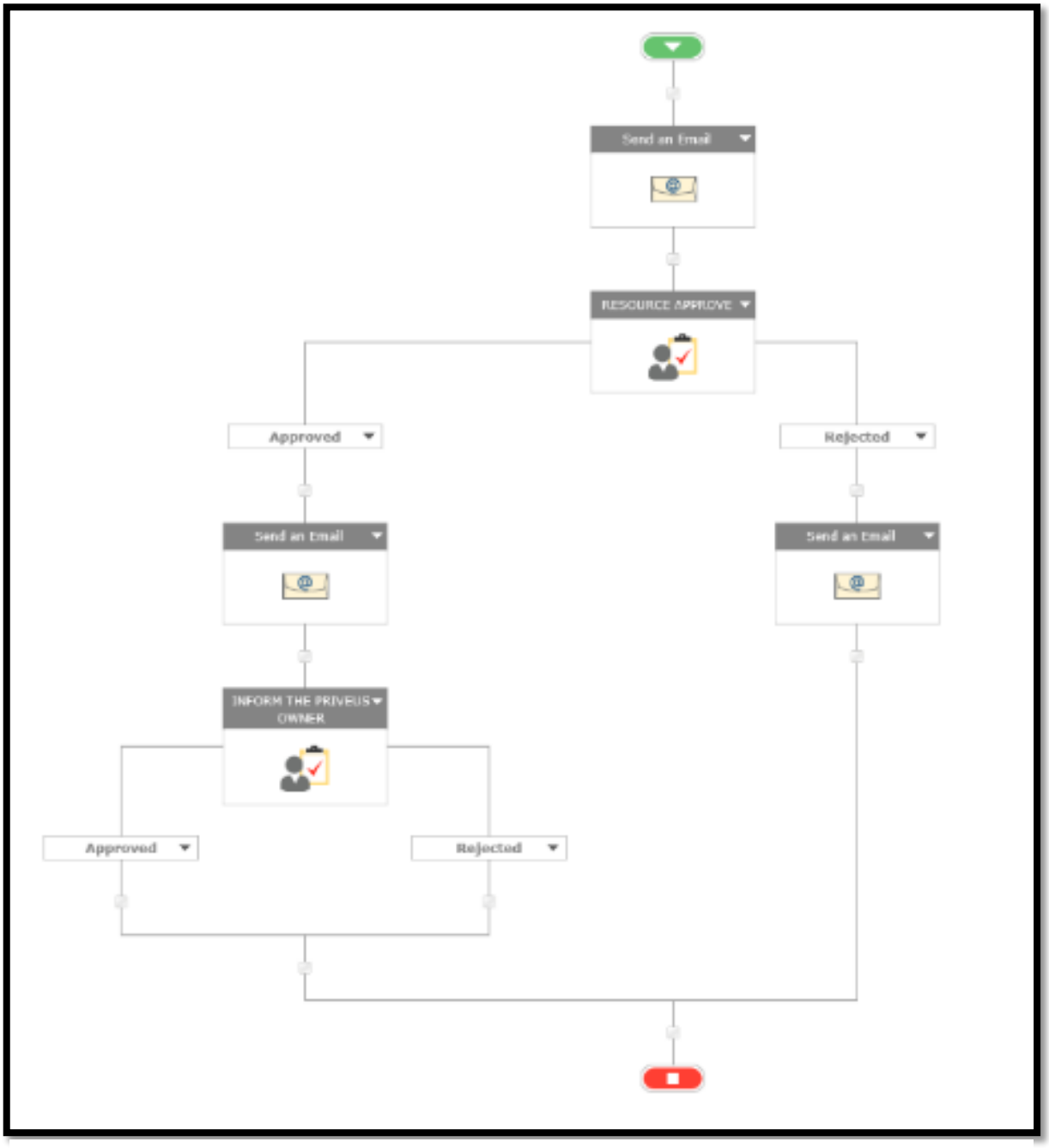


Figure 46- Resource Emergency Workflow (Appendix)

Observations of POL and PMOL activities:

Tables presents description of each activity in POL and PMOL As-Is models, project team developed it during first phase of project to understand operations better.

Processes-POL	*Operator*	*Stakeholder*	*Note*
Review the Report	Leanked Manager		Report is not official, operator inform by a call or an email.
Select Team Members	Leanked Manager	Leanked Employees	Since the team is small, selection is easy but if team grow or number of clients grows it will be difficult and also there is no list which help operator in selection of members base on their skills.
Contact Client	Dedicated Team	Client	This activity is not transparent and human errors may cause bad impression on client in this touch point.
POL diagnostic	Dedicated Team	Client	Resource selection takes time and may cause human errors, lack of resource may involve other operator to solve the problem. Sometimes client forget about meeting in facility therefore an alert appreciated. There is no defined templates to facilitate activity and checklist may help operators to observe all important concepts during their visit. Lack of shared information may cause loose of information and quality of work is not transparent for manager.
Prepare internal Presentation	Dedicated Team	Dedicated Team	Lack of standardization cause more time both for provider and reviewer in future. This preparation should not takes more than 5 day but there is no alert to remind delay in this activity.
Send report and presentation	Dedicated Team	HM & Leanked managers	Send the report is done by email predefined work flows could help to decrease the lead time.
Schedule internal presentation	Leanked Manager	HM, Leanked Managers & Dedicated Team	There is no predefined dates for these meetings which cause delays in processes and a shared calendar may solve the problem and make it easy for stakeholders to be in presentation
Review the Work	Leanked Manager		Reports are not standardized therefore takes more time than it should. Moreover the reviewer information is limited since the Diagnostic activity is not transparent for reviewer.
Participate in Presentation	Leanked Manager & HM manager		Lack of good coordination cause absence of stakeholders.
Present the report	Dedicated Team		Dedicated team may face lack of resources. The current system for reservation leads to human errors
Share Comments	Leanked Manager		Manually, comments do not follow any template and manager could not review more information to share his comment therefore the quality of service decrease.
Improve the work	Dedicated Team		The roles are not well defined in team therefore, consulters may forget to perform the task.

Schedule meeting in client's facility	Leanked Manager	Client Dedicated Team HM manager	Since access to stakeholders is difficult, this task although seems simple is a time consuming task.
Public Presentation	Dedicated Team	HM manager Leanked Manager Dedicated Team	Sometimes this task is faced difficulties caused by lack of resource.
Participate in final presentation	Leanked Manager		It is appreciated, If there was an alert to remind stakeholders.
Send result to financial department	Leanked Manager		This task could be done with dedicated team.
Prepare invoice	Financial Director	Financial Department	No problem
Print and send report with invoice to client	Financial Director	Client	No problem

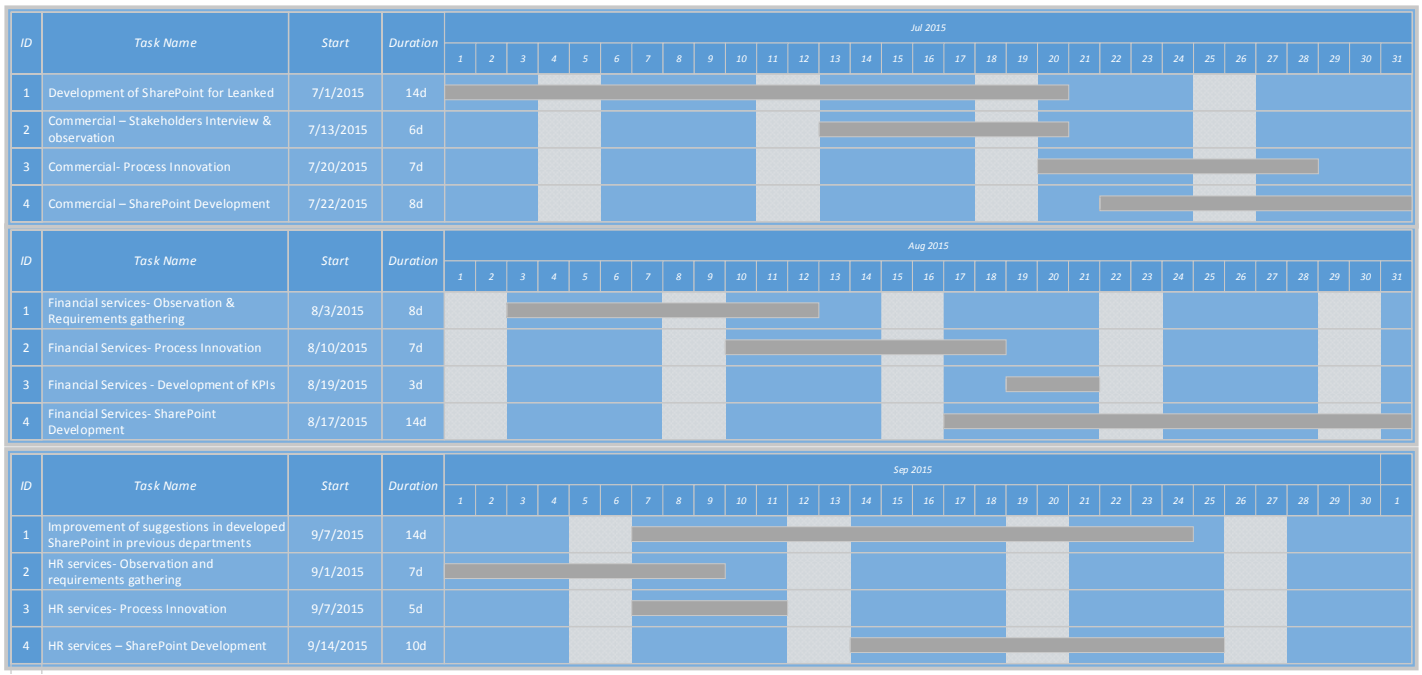
Table 15- Activities of POL operation (Appendix)

Processes-PMOL	***Operator***	***Stakeholders***	***Note***
Receive Contract	HM manager	Client CFO	Contracts store by CFO, this is a very traditionally way which decrease the ability of rapid access to informations in contracts. Therefore an integrated information system could improve this activity.
Select team	Leanked Manager	Leanked Employees	Currently, manager knows his consulters capabilities but if company grows, it could be better to have access to all employee's capabilities and assign them to projects very fast by access to their capabilities list.
Contact Client for first meeting	Dedicated Team	Client	If PMOL team is different from POL team, client will experience a change in this touch point since new team is unfamiliar with client culture. Therefore if it was possible to flow this kind of information from POL to PMOL. It could be useful.
Inform managers	Dedicated Team	Client	No problem
Start Project	Dedicated Team	client	No problem
Check financial status each month	Dedicated Team	CFO	There is not any standard operation for this activity which leads to serving clients without knowing if they pay for service or not.
Continue project to next month	Dedicated Team	HM & Leanked Manager	No problem
Make report each three month	Dedicated Team		Lack of template and standardization decrease quality and increase time needed.
Contact manager	Dedicated Team		Not standard operation would leads to human errors.
Track payment	Financial Director		No Problem
Approve financial status of client each month	Financial Director		No problem

Table 16- Activities of PMOL operation (Appendix)

Further work

Since company is interested to continue this project and conduct similar projects in its departments, this Gantt chart for future project during three months had been developed.



ID	Task Name	Start	Duration
1	Development of SharePoint for Leanked	7/1/2015	14d
2	Commercial – Stakeholders Interview & observation	7/13/2015	6d
3	Commercial- Process Innovation	7/20/2015	7d
4	Commercial – SharePoint Development	7/22/2015	8d

Jul 2015: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

ID	Task Name	Start	Duration
1	Financial services- Observation & Requirements gathering	8/3/2015	8d
2	Financial Services- Process Innovation	8/10/2015	7d
3	Financial Services - Development of KPIs	8/19/2015	3d
4	Financial Services- SharePoint Development	8/17/2015	14d

Aug 2015: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

ID	Task Name	Start	Duration
1	Improvement of suggestions in developed SharePoint in previous departments	9/7/2015	14d
2	HR services- Observation and requirements gathering	9/1/2015	7d
3	HR services- Process Innovation	9/7/2015	5d
4	HR services – SharePoint Development	9/14/2015	10d

Sep 2015: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 1

As it mentioned in Conclusion chapter, Project team starts a similar project in Commercial Department, picture presents As-Is model of this department BP regarding Leanked clients.

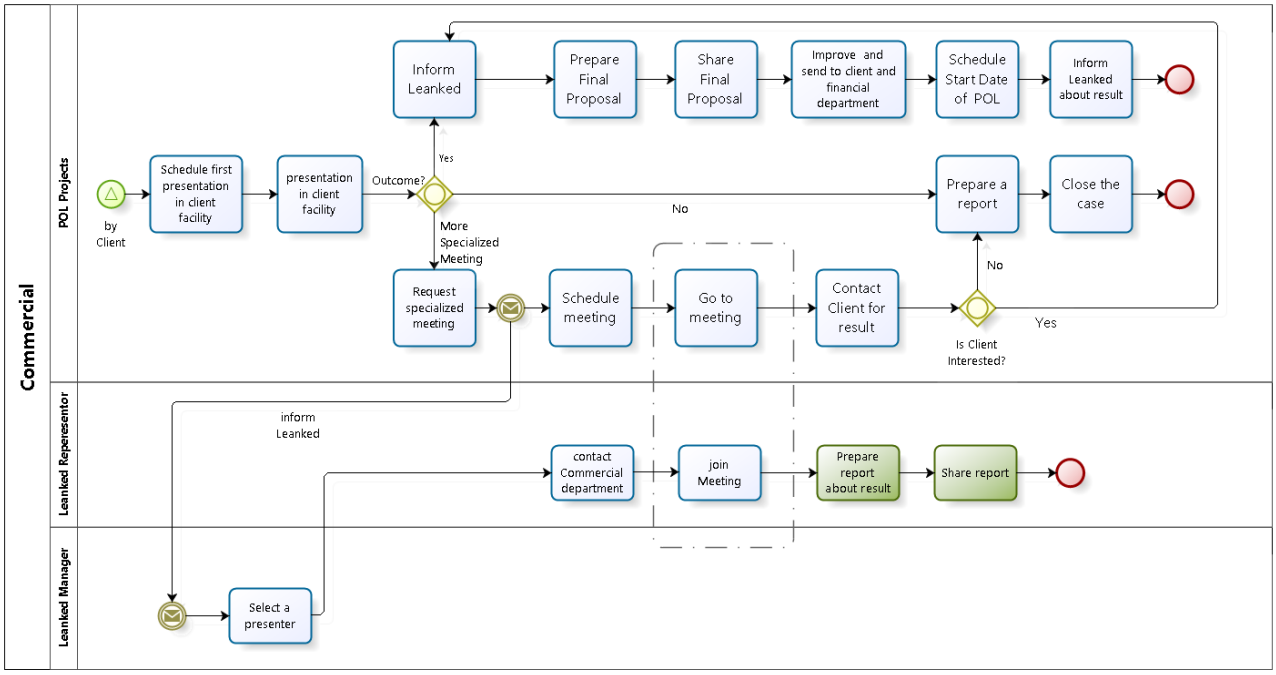


Figure 47- Commercial Department BPMN (Appendix)